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Indiana's Timber Resource, 1986: An Analysis

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This report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay the retrieval costs. These costs range from less than $100 for a relatively simple request to $2,000 for a complex retrieval involving the services of a Forest Inventory and Analysis programmer. Requests will be filled so as to minimize the impact on the Forest Inventory and Analysis Work Unit.

Requests for unpublished information may be directed to:

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Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin.

Requests for unpublished information from the Indiana inventory may also be directed to:

State Forester
Indiana Department of Natural Resources
Division of Forestry
613 State Office Building
Indianapolis, Indiana 46204

FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Renewable Forest and Rangeland Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for forest inventory and analysis in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin.

Fieldwork for the Indiana Statewide forest inventory was begun in July 1985 and completed in December 1986. Reports on the two previous inventories of Indiana's timber resource are dated 1950 and 1967.

More accurate survey information was obtained during the 1986 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding provided by the Indiana State Legislature through the Division of Forestry, Indiana Department of Natural Resources. The Department also surveyed primary wood-using plants in the State. Data from this survey were used to help estimate the quantity of timber products harvested in the State. Indiana Department of Natural Resources personnel have also assisted in training field personnel, analyzing information obtained from the survey, and preparing this report.

Aerial photos used in the Indiana Forest Inventory were furnished by the Hoosier National Forest and the USDA Agricultural Stabilization and Conservation Service.

The following FIA reports on the 1986 Indiana inventory have been published (see Literature Cited for complete bibliographic information):

Blyth, McGuire, and Smith 1987
Hansen 1987
Leatherberry 1987
Hansen and Golitz 1988
Smith and Golitz 1988

A complete set of Indiana inventory tables (except projections) is found in Smith and Golitz 1988. Spencer, Kingsley, and Mayer 1990 contains only the core tables common to all eastern FIA statistical reports, in addition to projection tables and a few other tables.

HIGHLIGHTS

Area

- Area of forest land rose from 4.0 million acres in 1967 to 4.4 million in 1986.
- Timberland area increased from 3.9 million acres in 1967 to 4.3 million in 1986. Primary reason for the increase is the reversion of wooded pasture and improved pasture to timberland.
- Perry County (153 thousand acres), Harrison County (132 thousand), Brown County (132 thousand), and Orange County (129 thousand), contain the largest areas of timberland in the State.
- The 1986 maple-beech forest type (includes cherry-ash-yellow-poplar type to be comparable with 1967 maple-beech type) covers the largest area in the State (1.6 million acres), displacing oak-hickory, which lead in 1967 with 2.4 million acres, but slipped to second in 1986 with 1.4 million.
- Sawtimber stands accounted for 64 percent of the timberland area in 1986, compared to 52 percent in 1967. The area of seedling-sapling and poletimber stands dropped between inventories.
- Thirty-seven percent of the timberland supports more than 5,000 board feet of timber per acre.
- Fifty-two percent of the stands are less than 50 years old.
- Nonindustrial private owners hold 87 percent of the State's timberland.
- Half of the privately owned timberland (including forest industry timberland) is in holdings of 51 acres or more.
- Two-thirds of the privately owned timberland has been held by the same owner for at least 10 years, and one-third has been held for 20 years or more.
- Seventy-six percent of the timberland grows trees taller than 70 feet at age 50, considered good sites in the Midwest.
- Forest plantations account for 105 thousand acres, 60 percent of which are in the Knobs Unit.

Number of Trees

- The number of growing-stock trees 5.0 inches in diameter and larger increased from 311 to 393 million from 1967 to 1986.

Timber Volume

- Growing-stock volume increased from 3.7 to 5.2 billion cubic feet between 1967 and 1986, a 43-percent rise.
- Sawtimber volume rose from 12.5 to 19.2 billion board feet between inventories, a 54-percent gain.
- Forty-five percent of the growing-stock volume is in the Knobs Survey Unit.
- Oaks account for 30 percent of the growing-stock volume (1.6 billion cubic feet) in 1986, largest of any species group. However, in 1967 oak volume represented 40 percent of the total (1.4 billion).
- The hickories (574 million cubic feet), hard maple (455 million), yellow-poplar (433 million), ash (360 million), and soft maple (244 million) follow the oaks in ranking of growing-stock volume.
- Cull and salvable dead trees represent 893 million cubic feet, in addition to the 5.2 billion cubic feet of growing stock.
- Greatest volume of growing stock is in stands aged 41 to 60 years (32 percent of the total).
- Private owners hold 85 percent of the growing-stock volume.
- Average growing-stock volume per acre was 938 cubic feet in 1967; and 1,215 cubic feet in 1986.
- Sawtimber average volume per acre was 3,212 board feet in 1967, compared with 4,475 board feet in 1986.
- Eighty-three percent of the sawtimber volume is in log grades 3 and 4, poorest of the four grades.

Stand Conditions

- Net annual growth on growing-stock trees rose from 104 million (2.8 percent of inventory) to 154 million cubic feet (2.9 percent of inventory) between 1966 and 1985.
- Net annual growth on sawtimber trees increased from 270 million to 726 million board feet between 1966 and 1985.
- Growing-stock growth per acre averaged 26.6 cubic feet in 1966, compared to 35.8 cubic feet in 1985. Sawtimber growth per acre, which averaged 69.3 board feet in 1966, increased to 169.0 board feet in 1985.
- Annual mortality of growing stock increased from 12 million cubic feet in 1966 to 38 million in 1985.

Timber Use

- Timber removals from growing stock in 1985 amounted to 93 million cubic feet, compared to 65 million cubic feet in 1966, a 43-percent gain.
- Sawtimber removals totaled 462 million board feet in 1985, compared to 345 million in 1966, a 34-percent increase.
- Oak species represented 45 percent of the total growing-stock removals in 1985.

Biomass

- Live tree biomass (trees at least 1 inch in diameter) amounted to 328 million green tons in 1986, an average of 76 tons per acre.
- Fifty-four percent of the biomass (177 million green tons) is in the boles of growing-stock trees.

Projections

- The low removals option projection shows growing-stock inventory growing from 5.2 billion to 7.0 billion cubic feet from 1986 to 2016, a 34-percent increase. Growth exceeds removals throughout the projection period.
- The high removals option projection shows growing-stock inventory increasing from 5.2 billion cubic feet in 1986 to 5.9 billion in 2006, then declining to 5.7 billion in 2016. Removals exceed growth from 2011 to 2016, the end of the projection period.

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Indiana's Timber Resource, 1986: An Analysis

John S. Spencer, Jr., Neal P. Kingsley, and Robert W. Mayer

Indiana's forests are many things to many people. To some the forest provides jobs or forest products, to others it is a place to hunt or camp or watch birds, to still others the forest is a place to convert to shopping centers and parking lots. Whatever its use, the State's forest land, representing 1 out of every 5 acres of land, is an important element in the economic and social well-being of Indiana's citizens. Because the forest is alive, it is constantly changing. This report discusses the present forest situation as well as some of the changes that have occurred since the last forest inventory in 1967.

FOREST AREA GAINS

The area of forest land, which had fallen from 4.1 million acres in 1950 (U.S. Department of Agriculture 1953) to 4.0 million in 1967 (Spencer 1969), rebounded to 4.4 million in 1986.[1] Similarly, the area of timberland (see Definition of Terms in Appendix), which had sagged from 4.1 million acres in 1950 to 3.9 million in 1967, increased to 4.3 million in 1986 (fig. 1). The primary reason for the positive change is the reversion of wooded pasture and improved pasture to timberland. This probably reflects the shift from pasturing cattle to feeding them in feed lots. Also, as consumer demand for red meat has fallen off, the incentive to graze livestock on these lands has fallen off. Another reason for the increase in timberland, particularly in the southeastern part of the State, is the restocking of lands extensively cleared during the late 1800's and then maintained in an open condition throughout the early 1900's by grazing and uncontrolled wildfire. These lands were slow in regaining timberland stocking levels because of the relatively unproductive and erodible soils present.

Figure 1.—*The area of timberland in the State increased an average of 21,000 acres per year between 1967 and 1986.*

[1] *Forest areas for 1950 have been adjusted from those published after the 1950 inventory to conform to 1986 areas because of changes in survey definitions and procedures.*

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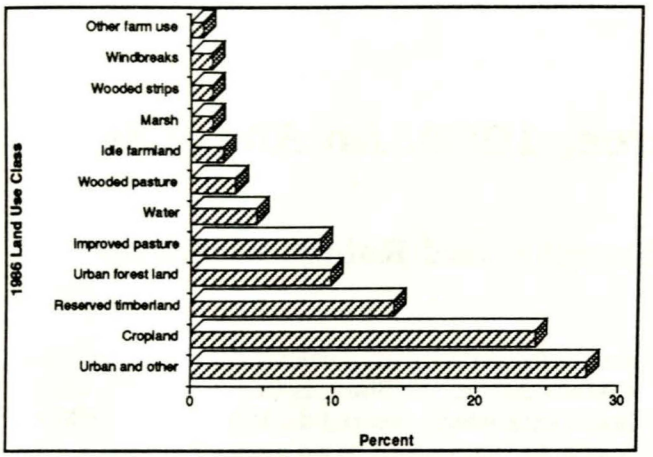

Figure 2.—*Percent of plots classed as timberland in 1967 that changed to other land uses by 1986.*

SOME TIMBERLAND CHANGED USE BY 1986

A measure of the change among land uses between inventories is possible because a portion of the sample plots established in 1967 were remeasured in 1986. Analysis of these plots shows that 86.7 percent of the plots classed as timberland in 1967 remained as timberland in 1986. The remaining 13.3 percent had changed to another use, primarily urban and other, and cropland, as shown in figure 2.

These losses to the 1967 timberland base were offset by larger gains to timberland, primarily from wooded pasture and improved pasture (fig. 3).

Reserved timberland, primarily parks and natural areas set aside from timber production, increased from 39 thousand to 143 thousand acres between 1967 and 1986. Woodland, defined as forest land that is unproductive and incapable of growing at least 20 cubic feet of wood per acre annually, amounted to 30 thousand acres in 1967, but none was found in 1986.

MORE TIMBERLAND IN KNOBS UNIT

South-central Indiana's Knobs Survey Unit (fig. 4) contains the largest area of timberland, 1.7 million acres (41 percent); followed by the Northern Unit, 1.1 million acres (26 percent); the Lower Wabash Unit, 0.9 million acres (20 percent); and the Upland Flats Unit, 0.6 million acres (13 percent). Five of the six counties with

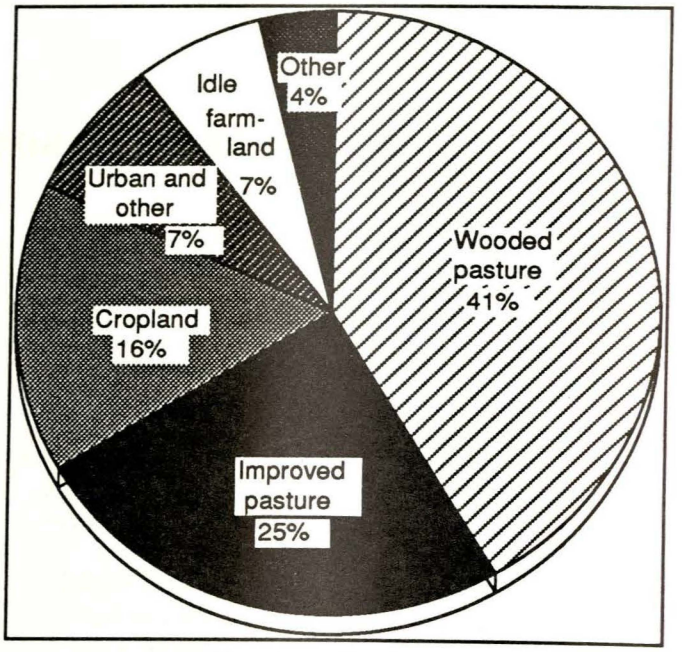

Figure 3.—*Percent of area by land use class (1967) that changed to timberland by 1986.*

the greatest area of timberland in the State are in the Knobs Unit: Perry (153 thousand acres), Harrison (132 thousand), Brown (132 thousand), Orange (129 thousand), and Lawrence (125 thousand). Martin County (128 thousand) in the Lower Wabash Unit rounds out the six.

MAPLE-BEECH FOREST TYPE MOST EXTENSIVE

In 1967 the oak-hickory forest type[2] dominated with 2.4 million acres of timberland (61 percent of the State total), and the maple-beech type[3] was a distant second with 0.8 million acres (20 percent of the total). By 1986 the situation had reversed and maple-beech covered the largest area with 1.6 million acres (38 percent of the total), and oak-hickory moved to second place with 1.4 million acres (33 percent).

Most of the lost oak-hickory acres converted to maple-beech according to an analysis of plots established in 1967 and remeasured in 1986. Table 1 presents the results of this analysis. Of

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[2]*Includes 1986 oak-hickory, chestnut-scarlet oak, and sassafras-persimmon forest type areas.*

[3]*Includes 1986 maple-beech and cherry-ash-yellow-poplar forest type areas.*

Figure 4.—*Location of Forest Survey Units in Indiana.*

Table 1.--Forest land classification changes in Indiana, 1967-1986

(In thousand acres)

1967 land classification	1967[2] area	1986 land classification[1]														
		Timberland - forest type														Reserved timberland, woodland and nonforest land
		Jack-red-white pine	Shortleaf pine	Scotch-Virginia pine	Oak-pine	Oak-hickory	Chestnut-scarlet oak	Sassafras-persimmon	Oak-gum	Lowland oak	Elm-ash-soft maple	Cotton-wood	Maple-beech	Cherry-ash-yellow-poplar	Non-stocked	
Timberland																
Pine	54.0	5.2	18.4	24.6	--	--	--	--	--	--	3.6	--	1.1	--	--	1.1
Oak-pine	46.0	1.3	1.0	5.4	15.9	1.3	--	--	--	--	7.1	--	--	7.0	--	7.0
Oak-hickory[3]	2,366.7	3.1	--	4.3	43.5	1,214.1	38.9	--	25.2	22.3	171.3	--	296.0	278.8	--	269.2
Oak-gum[4]	52.2	--	--	--	--	--	--	--	14.1	5.4	16.9	--	--	--	--	15.8
Elm-ash-soft maple[5]	524.3	6.5	--	6.3	3.1	8.3	--	--	--	--	288.8	12.4	34.6	57.6	7.0	99.7
Maple-beech[6]	771.2	--	2.9	--	--	33.7	--	3.5	--	--	71.9	--	461.3	107.9	--	90.0
Aspen-birch	13.1	3.6	--	2.9	--	--	--	--	--	--	2.4	--	--	--	--	4.2
Nonstocked	68.3	--	1.6	3.2	--	8.8	--	--	--	--	13.2	--	7.6	4.5	4.2	25.2
Subtotal	3,895.8	19.7	23.9	46.7	62.5	1,266.2	38.9	3.5	39.3	27.7	575.2	12.4	800.6	455.8	11.2	512.2
Reserved timberland, woodland, and nonforest land	19,106.3	35.0	--	23.9	41.7	104.6	7.2	16.3	12.4	3.2	255.3	6.0	184.1	193.2	29.3	18,194.1
All land classes	23,002.1	54.7	23.9	70.6	104.2	1,370.8	46.1	19.8	51.7	30.9	830.5	18.4	984.7	649.0	40.5	18,706.3

[1] Read across rows to determine dispersion of 1967 classes to 1986 classes. Read down columns to determine origin of 1986 classes.

[2] Total land area adjusted to conform to 1982 National Resource Inventory, Soil Conservation Service.

[3] Includes all the 1986 oak-hickory, chestnut-scarlet oak, and sassafras-persimmon types.

[4] Includes all the 1986 oak-gum and lowland oak types.

[5] Includes all the 1986 elm-ash-soft maple and cottonwood types.

[6] Includes all the 1986 maple-beech and cherry-ash-yellow-poplar types.

Figure 5.—*Black cherry and yellow-poplar saplings dominate this former oak-hickory site (foreground) after it was logged.*

the 2.4 million acres in the oak-hickory type in 1967, 1.2 million remained in the oak-hickory type by 1986, 0.6 million converted to the maple-beech and cherry-ash-yellow-poplar types (fig. 5) (the latter two 1986 types comprised the 1967 maple-beech type), 0.3 million converted to other forest types, and the remaining 0.3 million moved into reserved timberland, woodland, or nonforest classes. The 1986 oak-hickory, chestnut-scarlet oak, and sassafras-persimmon types (totaling 1.4 million acres), which make up the 1967 oak-hickory type, include not only the 1.2 million acres that remained oak-hickory between inventories, but also the 0.1 million from non-timberland and the 0.1 million from other forest types.

Three-fourths of the 1967 area of maple-beech remained maple-beech in 1986 (0.6 million acres). In addition, the 0.6 million acres of oak-hickory in 1967 that converted to maple-beech, mentioned above, and 0.4 million acres from non-timberland and other types swelled the 1986 maple-beech area to 1.6 million acres.

To use table 1 to find what became of the 2,366.7 thousand acres of oak-hickory in 1967, simply read across the oak-hickory row and notice that 3.1 thousand acres are now typed jack-red-white pine, 4.3 thousand are now typed Scotch-Virginia pine, 43.5 thousand are now typed oak-pine, 1,214.1 thousand are now typed oak-hickory, and so on to the end of the row to 269.2 thousand acres now classed as non-timberland. To determine the source of the 1986 oak-hickory type area, read down the oak-hickory column. This shows that 1.3 thousand acres came from the oak-pine type, 1,214.1 thousand remained oak-hickory, 8.3 thousand came from the elm-ash-soft maple type, 33.7 thousand came from the maple-beech type, 8.8 thousand came from formerly nonstocked land, and 104.6 thousand came from non-timberland.

Several factors contribute to the decline of oak-hickory and the rise of maple-beech. First, maple-beech is the climax forest type for most Indiana sites, except dry uplands and moist drainages. The intervention of humans in the form of land clearing, logging, grazing, and fire changed the composition of the forest from a preponderance of maple-beech to a mix of types, especially oak-hickory. The direction of natural plant succession on these lands, however, is

inexorably toward a return to maple-beech. Second, high-grading stands—harvesting only trees of the most desirable species or size—has been practiced widely in Indiana. Most oak-hickory (and other) stands contain some species associated with the maple-beech type; and if only large oaks are removed, the resulting proportion of stocking of this maple-beech component may be high enough to reclassify the residual stand as maple-beech when the stand is reinventoried. Third, when grazing by domestic animals is suspended in oak-hickory (and other) stands, seedlings are better able to become established. Because maple is more shade-tolerant than oaks and because oak reproduction is generally more difficult to obtain than maple, maple is more likely to regenerate these stands than oaks are.

The areas of all other forest types increased between 1967 and 1986. The elm-ash-soft maple type, third largest, increased 62 percent to 0.8 million acres. Pine forest types gained 176 percent to 149 thousand acres, largely the result of tree planting. Oak-pine type area rose 127 percent to 104 thousand acres, and the area of oak-gum increased 58 percent to 83 thousand acres. Nonstocked areas declined 41 percent to 41 thousand acres.

SAWTIMBER STANDS PREDOMINATE

Indiana's timberland was dominated by sawtimber stands in 1967 (52 percent of the total area), and it is even more heavily weighted to sawtimber stands in 1986 (64 percent), as shown in figure 6. The 36-percent gain in area of sawtimber stands reflects the waves of trees growing out of the poletimber size-class into sawtimber size between inventories. The Upland Flats Survey Unit contained a smaller proportion of sawtimber stands than other units—one half of its timberland, compared to two-thirds for the other units. Forest types with higher than average areas of sawtimber stands include the chestnut-scarlet oak type (100 percent of timberland area), lowland oak type (82 percent), oak-hickory (71 percent), and maple-beech (70 percent).

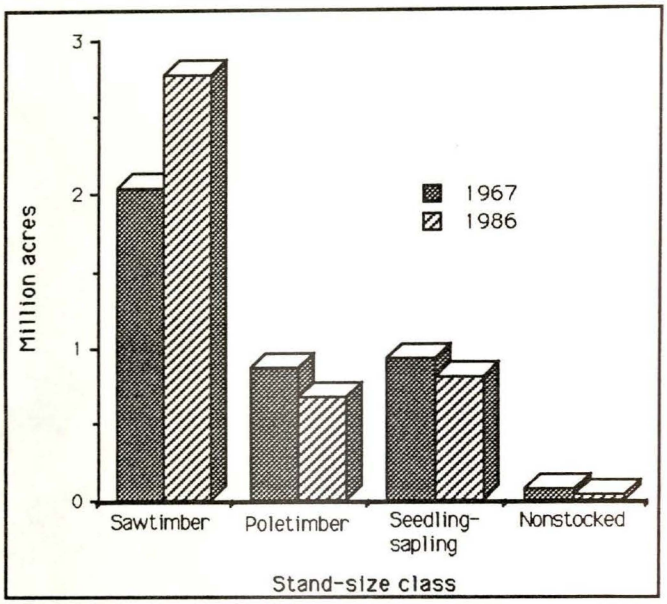

Figure 6.—*Area of timberland by stand-size class, Indiana, 1967 and 1986.*

The area of poletimber stands dropped 22 percent and the area of seedling-sapling stands declined 12 percent between inventories. Nonstocked area fell by 41 percent. The shortleaf pine type exhibits the greatest proportion of its timberland area in poletimber stands (61 percent), compared with the average for all types of 16 percent. The sassafras-persimmon type (79 percent) and Scotch-Virginia pine type (45 percent) display the largest proportions in sapling and seedling stands, compared with an average of 19 percent.

Thirty-seven percent of the State's timberland presently supports more than 5,000 board feet of timber per acre, as shown in the following tabulation. The Knobs Unit contains more of these high-volume stands than any other Unit (47 percent).

Stand volume class (Board feet)	Area (Thousand acres)	Percent
Less than 1,500	1,348.4	31
1,500 to 5,000	1,363.5	32
5,000+	1,583.9	37
Total	4,295.8	100

FIFTY-TWO PERCENT OF STANDS LESS THAN 50 YEARS OLD

The distribution of timberland by 10-year age classes is fairly even up to the 90-year class (fig. 7). Stands older than 90 years are much less frequent. More than half of the timberland area is in stands less than 51 years old.

Age class distribution of individual forest types is far more erratic. The entire jack-red-white pine type is aged 50 years or younger, as is 93 percent of the Scotch-Virginia pine type and 90 percent of the shortleaf pine type. Types consisting of long-lived species, understandably, contain greater proportions in older age classes. For example, 97 percent of the chestnut-scarlet oak type is 51 years or older, and 64 percent of it is 81 years or older. Eighty-two percent of the lowland oak type and 66 percent of the oak-hickory type is at least 51 years old.

If a rotation age—the planned number of years between regeneration of a stand and its final cutting for a specific product—is assumed for a forest type, the area in age classes older than rotation age provides an estimate of the area of overmature stands. These stands can be expected to decline in growth and vigor, but not necessarily in value. Assuming average rotation ages of 100 and 90 years, respectively, for the oak-hickory and maple-beech types, areas of overmature stands amounting to 105 and 92 thousand acres, respectively, are suggested (5 percent of the timberland area).

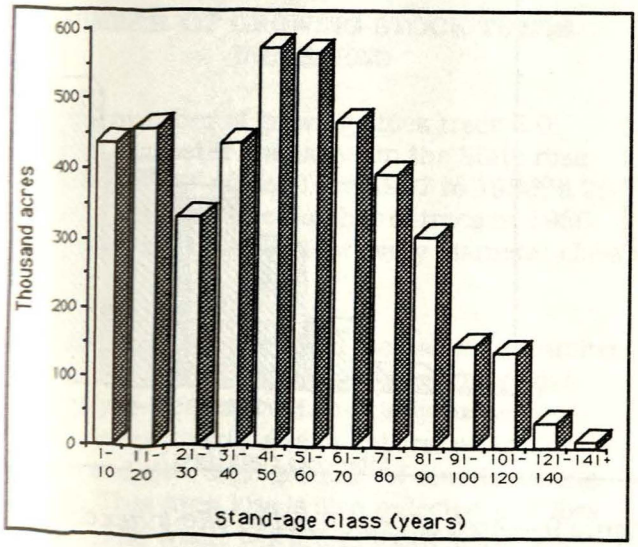

Figure 7.—*Area of timberland by stand-age class, Indiana, 1986.*

NONINDUSTRIAL OWNERS DOMINATE

Farmers own 1.7 million acres of timberland (40 percent of the total), and other private individuals and corporations (classed as miscellaneous private owners) account for another 2.0 million acres (47 percent), as shown in figure 8. Together, these nonindustrial private forest (NIPF) owners accounted for the bulk of Indiana's timberland in 1986, just as they did in 1967. However, in 1967 farmers owned 68 percent of the timberland and miscellaneous private owners accounted for 22 percent. Apparently, many farmers sold timberland between inventories. Also, part of the reason for the different results from the two inventories is a change in the definition of farmer between 1967 and 1986 (based on different values generated from the sale of agricultural products) that shifted some of the area previously classed as farmer owned into the miscellaneous private class.

Nonindustrial private owners account for 74 percent of the pine type area, although they hold

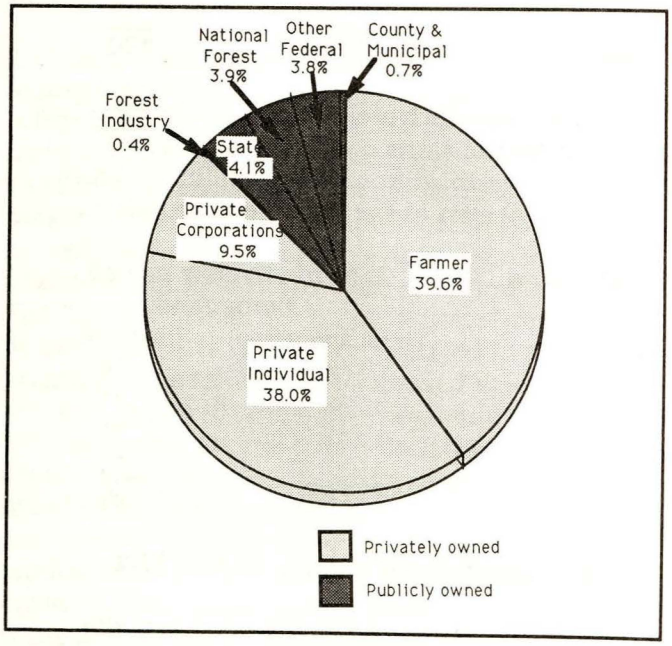

Figure 8.—*Area of timberland by ownership class, Indiana, 1986.*

87 percent of the timberland area. The Hoosier National Forest contains 18 percent of the pine forest type area, although the Forest accounts for only 4 percent of the total timberland. This reflects the high level of pine planting done in the past on National Forest land. NIPF owners also account for a proportionally smaller area of the oak-hickory type (79 percent) than other owners. But NIPF owners control larger amounts of the maple-beech (92 percent), elm-ash-soft maple (93 percent), and cherry-ash-yellow-poplar forest types (92 percent) than their timberland share.

Half of the privately owned timberland (including forest industry owned timberland) is in holdings of 51 acres or more. Another one-fourth is in holdings of 21 to 50 acres. These areas represent the total owned by an individual, and may include noncontiguous tracts:

Size of holding	Area of privately owned timberland	
(Acres)	(Thousand acres)	(Percent)
1-4	227.2	6
5-10	212.9	6
11-20	500.1	13
21-50	957.0	25
51-100	845.3	23
101-500	786.8	21
501-2,500	127.1	3
2,501-5,000	26.3	1
5,001+	78.2	2
Total	3,760.9	100

Two-thirds of the privately owned timberland has been held by the same owner for at least 10 years, and one-third has been held for 20 years or more, as shown in the following tabulation:

Owner tenure	Area of privately owned timberland	
(Years)	(Thousand acres)	(Percent)
1-4	584.1	16
5-9	793.4	21
10-19	1,145.9	30
20+	1,237.5	33
Total	3,760.9	100

AVERAGE SITE INDEX IS 81 FEET

Site index provides a perspective of forest site quality by classing timberland in terms of height growth made by dominant and codominant trees of the selected species at a specified age (usually 50 years). Generally, the better sites grow taller trees. However, site index values differ by species or forest type. A site index in the high range for one type may be considered average for another type. Therefore, if a site is converted from one forest type to another, the site index for the new type may be much different from that of the old type.

Sites in Indiana are generally good. Forest land in the Midwest can generally be described as follows:

Site index class	Description
55 or less	Poor site
56 to 70	Average site
More than 70	Good site

Seventy-six percent of Indiana's timberland (3.3 million acres) grows trees taller than 70 feet at age 50, and 56 percent of the timberland (2.4 million acres) grows trees taller than 80 feet (fig. 9).

The weighted average site index for all forest types in Indiana is 80.8 feet. The highest weighted average index is the 93.1 feet for the jack-red-white pine type, followed by cherry-ash-yellow-poplar (85.7 feet), maple-beech (84.6 feet),

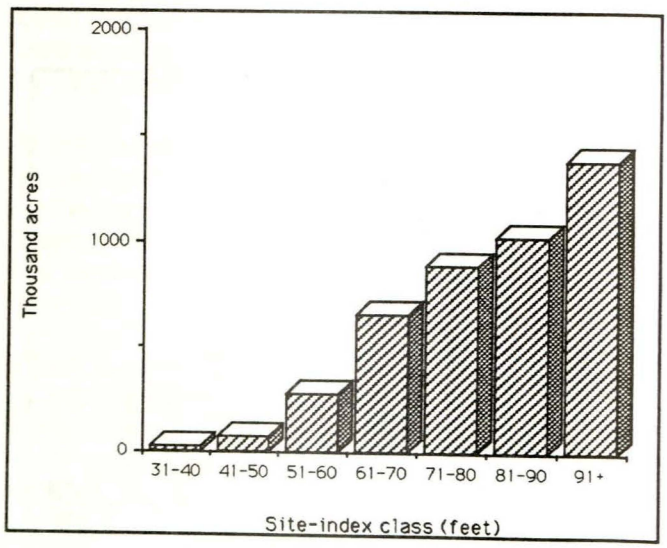

Figure 9.—*Area of timberland by site-index class, Indiana, 1986.*

shortleaf pine (82.7 feet), and elm-ash-soft maple (82.2 feet). The lowest average site index is the 70.6 feet for the chestnut-scarlet oak type.

TWO PERCENT OF TIMBERLAND IN PLANTATIONS

An estimated 105 thousand acres are in forest plantations, 60 percent of which are in the Knobs Unit. Ninety percent of the plantations grow pines:

Forest type	Area of plantation (Thousand acres)
Jack-red-white pine	40.2
Scotch-Virginia pine	34.2
Shortleaf pine	20.7
Elm-ash-soft maple	3.7
Cherry-ash-yellow-poplar	3.7
Oak-gum	1.5
Lowland oak	1.2
Total	105.2

These estimates of plantation areas are probably conservative, especially for hardwood types, because young hardwoods may be growing with or be overtopped by other hardwoods and may not be noticed by field crews.

Thirty-eight percent of the plantations are 31 to 40 years old, and were planted between 1946 and 1955. Nearly equal amounts have been planted in each of the three decades since.

NUMBER OF GROWING-STOCK TREES INCREASED

The total number of growing-stock trees 5.0 inches in diameter and larger in the State rose from 311 to 393 million from 1967 to 1986, a 26-percent increase. The number of trees in 1986 was greater than in 1967 for every diameter class (fig. 10).

All species, except the oaks, increased in number of trees. As mentioned earlier, the area of oak-hickory type declined substantially between inventories primarily due to natural plant succession and the "high grading" of stands during logging. This area loss is also reflected in a loss of trees. The white oak group (both select and other white oaks) was especially hard hit. Each diameter class, from the 6-inch to the 14-inch class, lost trees. In the 6-inch class (5.0 to 6.9 inches), the loss was 54 percent, but in the 14-inch class, the decline was only 4 percent. The red oak group showed declines in the 6-inch class (30-percent loss) to the 12-inch class (15-percent loss).

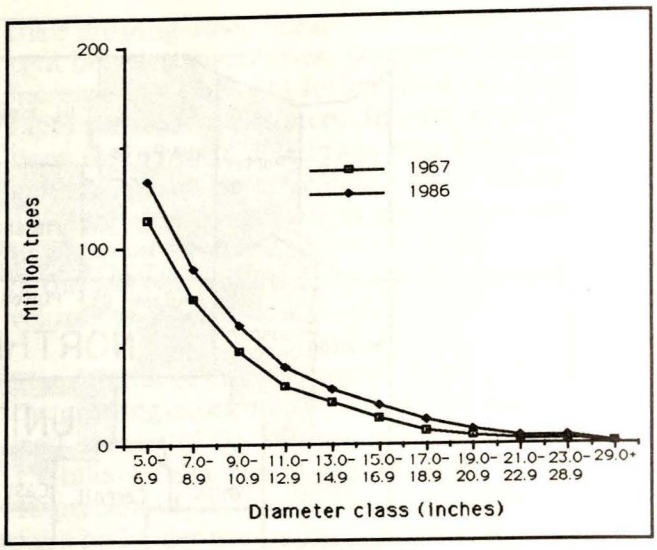

Figure 10.—*Number of growing-stock trees on timberland by diameter class, Indiana, 1967 and 1986.*

If Indiana's important oak resource is to be maintained or improved, policies designed to bring these lands under more intensive management will need to be implemented. Financial incentives to encourage private landowners to seek the advice of professional foresters before harvesting their timber or performing other forest practices would help turn the situation around. The Forest Classification Act, a State law passed in 1921, permits forest land enrolled in the program to be taxed at an assessed value of $1 per acre, a significant tax-savings and an incentive for landowners to maintain land in forest cover. The Division of Forestry prepares a detailed forest management plan on enrolled lands and revises the plan every 10 years. Although landowners are not required to follow the management plan, most owners perform at least some of the recommended practices.

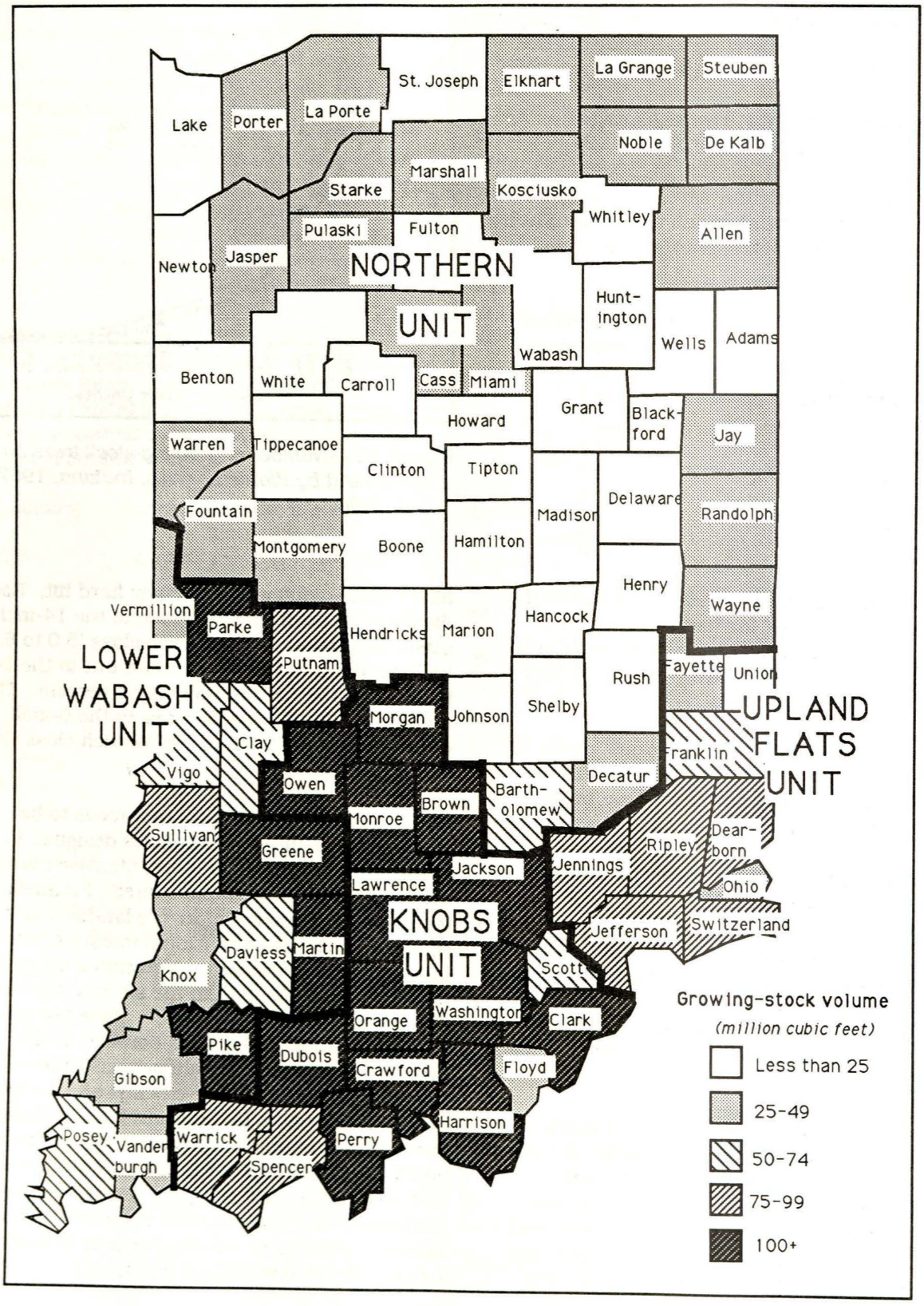

Figure 11.—*Growing-stock volume by county, Indiana, 1986.*

TIMBER VOLUME GAINS

The volume of growing stock in the State increased from 3.7 to 5.2 billion cubic feet between 1967 and 1986, a 43-percent gain. Sawtimber volume rose even faster, from 12.5 to 19.2 billion board feet[4], a 54-percent increase. These sharp increases came during a time when the area of timberland in Indiana expanded from 3.9 to 4.3 million acres, a 10-percent gain. However, the increases in timber volumes are more a result of larger average tree size in 1986 than of the added acres of timberland. Many of the added acres were previously wooded pasture or marginal farmland that reverted to timberland, but that contained only a few volume-producing trees. On the other hand, the area of sawtimber stands increased 36 percent (734 thousand acres) between inventories as many poletimber trees grew into sawtimber size.

ALMOST HALF OF VOLUME IN KNOBS UNIT

Forty-five percent of the growing-stock volume (2.3 billion cubic feet) is in the Knobs Survey Unit in the south-central part of the State (fig. 11). The Northern Survey Unit grows 24 percent of the State's growing-stock volume (1.2 billion cubic feet), the Lower Wabash Survey Unit grows 21 percent (1.1 billion), and the Upland Flats Survey Unit contains the remaining 10 percent (0.5 billion). The proportions of sawtimber in each Survey Unit are identical to the above proportions for growing stock.

Perry County (213 million cubic feet) and Brown County (190 million), both in the Knobs Survey Unit, lead all other counties in volume of growing stock and sawtimber.

MOST TIMBER VOLUME IN HARDWOODS, ESPECIALLY OAKS

Hardwoods dominate Indiana's forests, although slightly less in 1986 than in 1967. Hardwood growing-stock volume in 1967 (3.6 billion cubic feet) amounted to nearly 98 percent of the total, but in 1986 the hardwood volume of 5.0 billion cubic feet was 96 percent of the total. Although softwoods are only a minor element in the State, their growing-stock volume increased 142 percent between inventories, compared with an increase of 41 percent for hardwoods. These rapid softwood gains stem, in part, from plantations that grew to poletimber size (trees below poletimber size do not contribute to volume) from 1967 to 1986, evidenced by the tenfold increase in white pine volume, the more than quadrupling of the red pine volume, and the doubling of the volume of other yellow pines.

The volume of oaks amounts to 30 percent of the growing-stock total in 1986 (1.6 billion cubic feet), largest of any species group. However, the 1.4 billion cubic feet of oaks in 1967 represented 40 percent of that year's total. Therefore, the oaks no longer occupy as commanding a position in the State's supply of timber, and are not keeping up with the expansion of other species' volumes (fig. 12). Although all groups of oaks, except other white oaks, increased in volume between inventories, the rate of increase for all oaks was only 10 percent compared with an average increase of 41 percent for all hardwood species. The 39-percent loss between inventories in area of the oak-hickory forest type and the high demand for oak forest products are the major reasons for this slower rate of increase. As mentioned earlier, the area of the oak-hickory type lost 930 thousand acres between 1967 and 1986. At the same time, area of the maple-beech type (includes 1986 cherry-ash-yellow-poplar type) increased 863 thousand acres.

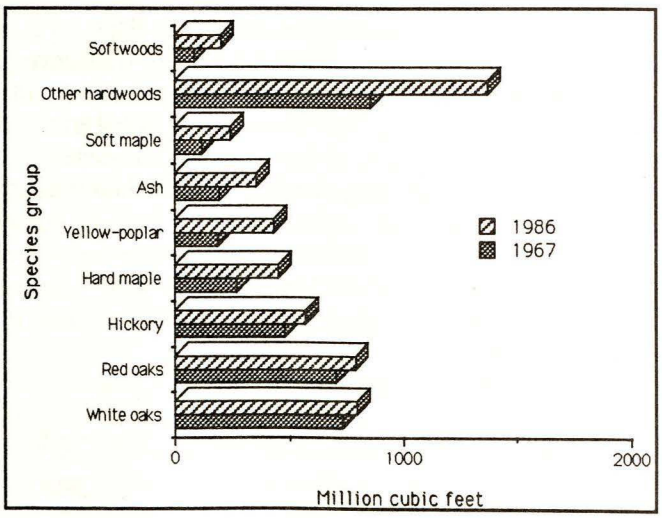

Figure 12.—*Volume of growing stock by species group, Indiana, 1967 and 1986.*

[4]*International 1/4-inch rule.*

The hickories, with 574 million cubic feet, contain the second largest volume among species groups, followed by hard maple (455 million), yellow-poplar (433 million), ash (360 million), and soft maple (244 million).

The change in the ranking of the volume of species between inventories tells something of the dynamic forces that interplay in the forest. The oaks and the hickories were first and second, respectively, in both inventories. Hard maple was third on both occasions, but its volume gained a substantial 65 percent by 1986, fueled by an increase in area of the maple-beech and cherry-ash-yellow-poplar forest types. Ash had the fourth largest volume in 1967, but was displaced by yellow-poplar in 1986, also partly due to the increase in the latter forest types, as well as the exceptionally fast growth rate of yellow-poplar—4.6 percent of inventory, third among species behind sweetgum (5.2 percent) and soft maple (5.0 percent). The fifth largest volume in 1967 belonged to yellow-poplar, but in 1986 ash was ranked fifth. Sycamore was sixth in 1967, but soft maple took its place in 1986. Tolerant of shade and fast-growing, soft maple is often able to benefit from plant succession and capture sites previously dominated by other species, especially if it is in the understory of disturbed stands.

VOLUME OF ALL CLASSES OF TIMBER IS 6.1 BILLION CUBIC FEET

Cull and salvable dead trees add 893 million cubic feet to the growing-stock total of 5.2 billion cubic feet (table 2). Cull and salvable dead tree volume amounts to 14.6 percent of the total in Indiana, suggesting that yields can be increased without affecting growing-stock levels by harvesting more of these trees.

Table 2.—*Net volume of timber on timberland by class of timber and softwoods and hardwoods, Indiana, 1986*

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Growing stock			
Poletimber	1,453	87	1,366
Sawtimber	3,765	114	3,651
Total growing stock	5,218	201	5,017
Rough and rotten cull	649	10	639
Short-log cull	162	2	160
Salvable dead	82	5	77
All classes	6,111	218	5,893

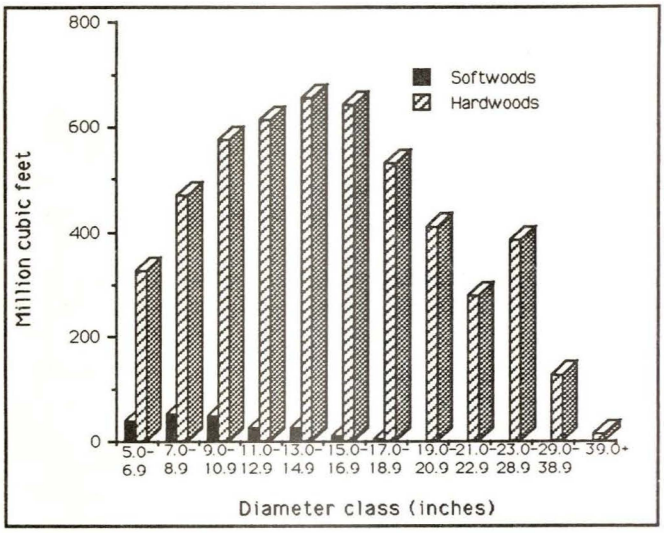

Figure 13.—*Volume of growing stock on timberland by softwoods and hardwoods, and diameter class, Indiana, 1986.*

Growing-stock volume by diameter class is greatest in the 14-inch class with volumes dropping off about equally in either direction (fig. 13). Softwood volume is concentrated much more in the smaller diameter classes—81 percent is in trees 12 inches in diameter or less, compared with 39 percent for hardwoods. The large volume of young softwoods in plantations accounts for much of this difference.

Species with the largest volumes in the higher diameters (24 inches and greater) include select red and white oaks, other red oaks, yellow-poplar, sycamore, cottonwood, and soft maple.

Individual species are scattered widely throughout forest types. The volumes of some species are high in some forest types with which they are not primarily associated. For example, 47 percent of the softwood volume is found in hardwood forest types. Volume in the oak-hickory type is largest, with 36 percent of the growing-stock total. However, one-third of the oak volume is found in other types—primarily the maple-beech type (13 percent) and the cherry-ash-yellow-poplar type (6 percent). And 21 percent of the hickory volume and 29 percent of the elm volume are in the maple-beech type. The largest share of the black walnut volume is in the cherry-ash-yellow-poplar type (34 percent), and the greatest black cherry volume is in the maple-beech type (36 percent).

LARGEST VOLUMES IN STANDS AGED 41 TO 60 YEARS

Volume of growing stock by 10-year stand-age classes is greatest in the 41- to 50-year and the 51- to 60-year classes, representing 32 percent of the total (fig. 14). The area of timberland supporting stands aged 41 to 60 years is also greatest, although it amounts to only 27 percent of the total area of timberland. Stands 41 to 60 years old originated between 1926 and 1945, a time when the public's interest in the protection and management of forest land was awakening.

Timber in stands more than 90 years old makes up 10 percent of the growing-stock volume (11 percent of the sawtimber volume). Most of this volume is in long-lived oak-hickory and maple-beech stands. No softwood stands are as old as 90 years. Older stands are important for a number of reasons: they provide ecological niches for some plant and animal species, they permit biological diversity, they furnish an increasingly rare esthetic and recreational opportunity, and they supply roundwood forest products of large size and high quality. In 1967 there were 567 thousand acres of these older stands in the State, but by 1986 there were only 331 thousand acres—a decline of 42 percent.

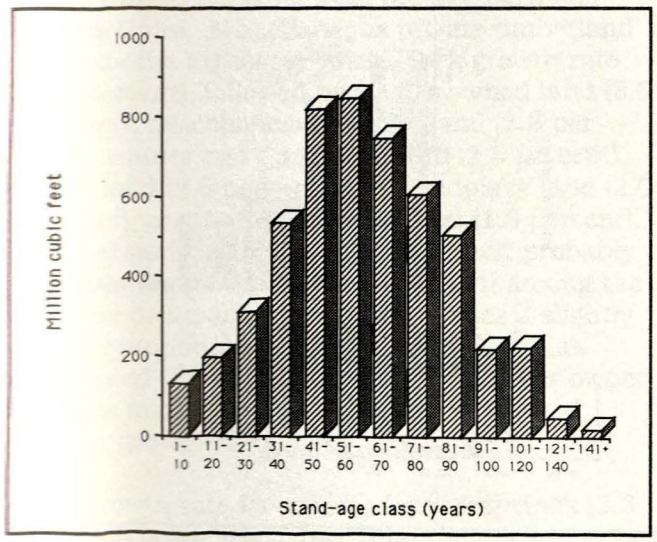

Figure 14.—*Volume of growing stock by stand-age class, Indiana, 1986.*

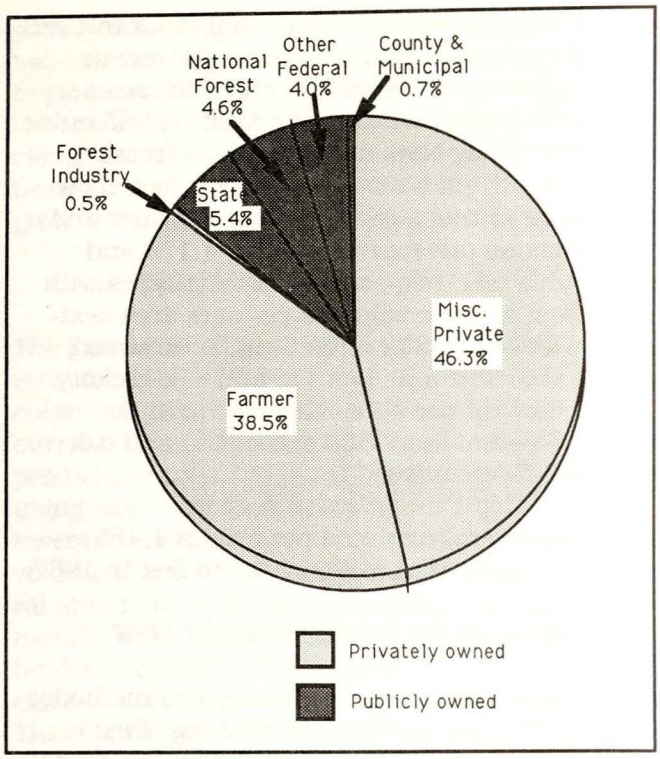

Figure 15.—*Percent of growing-stock volume on timberland by owner class, Indiana, 1986.*

EIGHTY-FIVE PERCENT OF GROWING-STOCK VOLUME IS PRIVATELY OWNED

Miscellaneous private owners hold 46 percent of the State's growing-stock volume (2.4 billion cubic feet), farmers own an additional 39 percent (2.0 billion cubic feet), and forest industry owns 0.5 percent (26 million cubic feet). Added together, private owners account for 85 percent of the volume or 4.5 billion cubic feet (fig. 15). In 1967 they accounted for 88 percent.

Private owners hold somewhat less of the softwood inventory (80 percent) than of the hardwood inventory (85 percent), probably reflecting a greater tendency to plant softwood trees on public land.

The bulk of the growing-stock volume (82 percent) is in sawtimber stands. Even more of the sawtimber volume (89 percent) is in sawtimber stands. Poletimber stands support 12 percent of the growing-stock volume (7 percent of the sawtimber volume), and sapling and seedling stands grow 6 percent of the growing-stock volume (4 percent of the sawtimber volume). Nonstocked areas provide less than 1 percent of the timber volume.

Average volume per acre of growing stock in 1986 is 1,215 cubic feet, up from 938 cubic feet in 1967. In Indiana, highest average volumes per acre are on State-owned timberland—1,593 cubic feet—followed by National Forest and forest industry land, each with 1,439 cubic feet. Lowest average volumes per acre are on farmer and miscellaneous private timberland, 1,178 and 1,186 cubic feet, respectively. Forest types with the highest average volumes per acre are chestnut-scarlet oak (1,812 cubic feet), cottonwood (1,530), shortleaf pine (1,400), and oak-hickory (1,373). Lowest per acre volumes are in the sassafras-persimmon (328 cubic feet) and oak-pine (893) forest types.

Sawtimber average volume per acre is 4,475 board feet, compared to 3,212 board feet in 1967.

QUALITY OF SAWTIMBER IS LOW

We estimated sawtimber quality by two methods: (1) estimating the grade of the butt log of each sampled sawtimber tree and applying that grade to the entire volume of the tree, and (2) estimating the grade of each log in the tree of a smaller sample of felled trees from a utilization study and applying the results to the total sawtimber inventory. These methods are discussed more completely in the Tree Quality section of the Appendix.

Three-quarters of the volume in sawtimber-sized trees is in the two poorest butt log grades of the four grades used. Seventeen percent of the volume is in butt log grade 2, and the remaining 8 percent is in grade 1. Small diameter trees do not meet the specifications for grades 1 and 2, and are automatically classed in the poorer butt log grades. Because most of the softwood sawtimber volume is in the smaller diameters, most of the softwood volume is in the poorer grades. Only 4 percent of the softwood sawtimber volume is in butt log grades 1 and 2, and 96 percent is in grade 3 and tie and timber. Hardwoods, with generally larger diameters, contain more volume in the better grades. Twenty-six percent of the hardwood sawtimber volume is in butt log grades 1 and 2, and 74 percent is in grade 3 and tie and timber. Species with the highest proportions of their sawtimber volumes in butt log grades 1 and 2 are sycamore (50 percent), select white oak (43 percent), ash (42 percent), cottonwood (41), and black walnut (41).

Because, in most cases, the grade of the butt log of a tree is better than the grade of upper logs, butt log grade classification tends to overestimate the volume in high quality trees. This is borne out by the estimate of log grade for all saw logs in all sawtimber trees, resulting from the utilization study mentioned above, which shows that 83 percent of the sawtimber volume is in log grades 3 and 4, poorest of the four grades (fig. 16). This compares with 75 percent of the sawtimber volume in butt log 3 and tie and timber, mentioned earlier. Thirteen percent is in log grade 2, and 4 percent is in grade 1. The higher the log grade, the greater the proportion of volume in the larger diameter classes. For example, the biggest share of volume in log grade 1 is in the 20- to 22-inch diameter classes (37 percent), but the largest proportion in grade 2 is in the 16- to 18-inch diameter classes (36 percent), and the greatest share in grades 3 and 4 is in the 10- to 14-inch diameter classes (41 percent). This is expected because larger diameter trees usually produce higher quality logs.

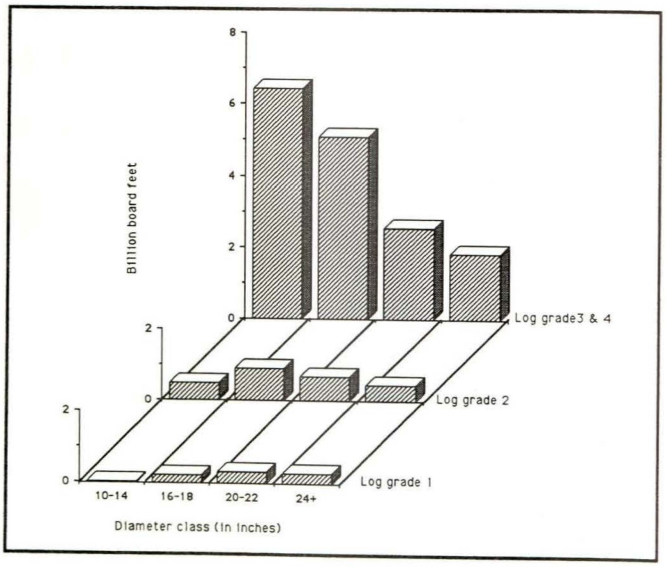

Figure 16.—*Net volume of sawtimber on timberland by log grade and diameter class, Indiana, 1986.*

VOLUME OF GROWTH GAINS

Since 1966, net annual growth on growing stock has increased from 104 to 154 million cubic feet, a gain of 48 percent. This reverses the trend between 1950 and 1966 when the volume of growth declined. There was virtually no difference in the rate of increase for softwoods (49 percent) or hardwoods (48 percent). Net annual growth of sawtimber increased from 270 to 726 million board feet between 1966 and 1985, a gain of 169 percent.

The growing-stock growth rate (growth as a percent of inventory) remained almost constant between inventories. The rate was 2.8 percent in 1966 and 2.9 percent in 1985. On a per acre basis, growing-stock growth averaged 26.6 cubic feet in 1966, but rose to 35.8 cubic feet in 1985, the result of the increasing inventory volumes per acre mentioned earlier. Sawtimber growth rates increased from 2.2 percent in 1966 to 3.8 percent in 1985; and sawtimber growth per acre, which averaged 69.3 board feet in 1966, jumped to 169.0 in 1985. These latter increases reflect the increasing average diameter class.

Growth rates differed little among Survey Units—rates ranged from 3.1 percent in the Upland Flats Unit to 2.9 percent in the Northern and Knobs Units. Miscellaneous private timberland exhibits the highest growing-stock growth rate (3.1 percent), followed by farmer-owned land (3.0 percent), miscellaneous federal land (2.8 percent), county and municipal land (2.6 percent), State land (2.5 percent), forest industry land (2.0 percent), and National Forest land (1.8 percent). Farmer and miscellaneous timberland probably receives the least forest management among the various owner classes, but it includes a slightly higher proportion of faster growing sites (as estimated from site class data) than other owner classes and, therefore, generates somewhat higher growth rates.

The growth rate for softwood growing stock (3.3 percent) is slightly higher than the hardwood rate (2.9 percent). Softwoods are usually much younger than hardwoods in the State—nearly two-thirds of the area of softwood forest types is in plantations, and 89 percent of the area in those softwood plantations is in stands 40 years old or younger. Young trees are usually the fastest growing, and softwood species in general grow faster than long-lived hardwoods.

POTENTIAL GROWTH ESTIMATED

The potential net annual growth in Indiana is estimated to be 333 million cubic feet, or 77 cubic feet per acre, about twice as high as the current 36 cubic feet per acre. We estimated the productive potential of timberland in the State using site class data collected during the latest inventory. Site class values represent the annual volume of growth per acre of fully stocked natural stands at culmination of mean annual increment[5]. We multiplied the area in each site class by the midpoint of the range of growth in that class to estimate potential growth in the State. This method yields a potential growth that is somewhat higher than expected because most stands in the State are not natural (unmanaged or uncut). Spurr and Vaux (1976) discounted an estimate of potential growth for the Nation by 10 percent to adjust for the differences between actual stand conditions and the fully stocked, natural conditions implicit in use of site class.

Table 3 shows the method used to estimate potential growth. The unadjusted potential growth of 370 million cubic feet in the table was discounted by 10 percent, as suggested by Spurr and Vaux, resulting in the adjusted 333 million cubic feet mentioned above.

Potential growth can be pushed even higher if intensive forest management, such as thinning, planting of genetically superior trees, crop tree release, vine removal, and fertilization, are conducted over wide areas.

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[5]*Culmination of mean annual increment is the point at which a curve plotting current annual increment crosses a curve plotting mean annual increment.*

Table 3.—*Estimation of potential net annual growth on timberland, Indiana, 1986*

Site class (foot³/acre/year)	Area of timberland	Potential[1] net growth per acre	Unadjusted total potential growth	Adjusted total potential growth (discounted by 10 percent)
	Thousand acres	*Feet³/acre/year*	*Thousand feet³/year*	
164-120	695.7	142.0	98,789.4	88,910.5
119-85	1,496.5	102.0	152,643.0	137,378.7
84-50	1,400.3	67.0	93,820.1	84,438.1
49-20	703.3	34.5	24,263.8	21,837.4
	4,295.8		369,516.3	332,564.7

[1]Midpoint of site class interval.

MORTALITY TRIPLES BETWEEN SURVEYS

Annual mortality of growing stock amounted to 38 million cubic feet in 1985, compared to 12 million cubic feet in 1966. Some of this increase is probably due to the improved method of estimating mortality we used during the 1986 inventory. The method involved observation of trees on two occasions (1967 and 1986) on remeasured plots, rather than on just one occasion (1967). However, some of the mortality increase is real because stands matured and more trees died. The mortality rate is 0.7 percent of inventory, up from 0.3 percent in 1966. The softwood mortality rate (1.1 percent) is much higher than the hardwood rate (0.7 percent).

Eighty-six percent of the mortality volume was due to "unknown and other" causes because it was impossible for the field crews to identify the primary cause of death. Crews must be confident that the cause of death they assign a dead tree is the primary agent that caused the tree to die, and not a secondary or tertiary agent. Of the 5.2 million cubic feet of mortality for which field crews were able to assign a cause, weather (primarily wind, ice, and snow storms) accounted for the largest proportion (45 percent), followed by disease (38 percent) and suppression (10 percent).

Sawtimber mortality in 1985 was 101 million board feet, 0.5 percent of inventory, up from 37 million in 1966 (0.3 percent of inventory).

TIMBER REMOVALS GAIN BY 43 PERCENT

Annual timber removals from growing stock in 1985 amounted to 93 million cubic feet, a 43-percent increase from the 1966 removals of 65 million cubic feet. The volume of softwood removals, which only amounted to 0.3 million cubic feet, declined between surveys, but hardwood removals increased. The 1985 growing-stock removals rate was 1.8 percent of inventory.

Sawtimber removals for 1985 totaled 462 million board feet, compared to 345 million board feet in 1966 (fig. 17). Softwood sawtimber removals increased by 6 percent, although they accounted for only 1 million board feet; and hardwood removals gained 34 percent from the 1966 level. The removals rate for sawtimber in 1985 was 2.4 percent of inventory, somewhat higher than the growing-stock rate. This reflects the predominant saw-log market and the much smaller market for smaller trees.

Removals of oak species represented 45 percent of total growing-stock removals in 1985. Oak removals in 1985 (42 million cubic feet) were 70 percent greater than in 1966 (25 million) as demand for oak—for flooring, cabinetry, and furniture—increased. The volume of removals of each of the oak species groups was greater in 1985 than in 1966. The select red oak and other red oak groups were harvested most intensely—removals rates of 3.4 percent of inventory for each. Other species with above average removals

rates were beech (2.4 percent), ash (2.2 percent), other white oak (2.2 percent), and yellow-poplar (2.2 percent).

BIOMASS ESTIMATED

The aboveground weight (biomass) of live trees and shrubs in the State was estimated as part of the inventory. This kind of information is important to those who need to know more about the total volume (including limbs, leaves, and bark) of vegetation on the ground because of our changing perception of the forest. Those concerned with wildlife habitat, for example, need to know something of the diversity and amount of plant species used by wildlife in the State. And as technology permits new ways of using wood fiber, a measure of the weight of wood on the ground may provide practical insights into available raw material.

Figure 17.—*Sawtimber removals in 1985 were 34 percent higher than in 1966.*

Total biomass of all live trees at least 1 inch d.b.h. on timberland in the State was 328 million green tons in 1986, an average of 76 tons per acre. The oak-hickory forest type contains about one-third of the biomass, 116 million green tons (84 tons per acre), followed by the maple-beech type with 79 million tons (80 tons per acre), the elm-ash-soft maple type with 57 million tons (69 tons per acre), and the cherry-ash-yellow-poplar type with 48 million tons (73 tons per acre).

Fifty-four percent of the biomass is in the boles of growing-stock trees. Tops and limbs of growing-stock trees account for 15 percent, as shown in the following tabulation:

Biomass component	Weight (Million green tons)	Percent
Growing-stock trees		
Stumps	12.8	4
Boles	176.7	54
Tops and limbs	51.1	15
Cull trees		
Stumps	3.1	1
Boles	43.0	13
Tops and limbs	11.8	4
Live 1- to 5-inch trees	29.1	9
Total	327.6	100

The combination oak-gum and lowland oak forest type contains the largest total shrub biomass (5,822 pounds per acre green weight), followed by the cherry-ash-yellow-poplar type (4,461 pounds per acre), and the combination of all pine types (3,219 pounds per acre).

Among the tall shrubs, which include live trees less than 1 inch d.b.h., prickly ash accounts for the largest average biomass (283 pounds per acre green weight)[6]. Nearly all the prickly ash biomass is in the cherry-ash-yellow-poplar forest type. Other tall shrubs with large amounts of biomass are hard maple (234 pounds per acre), white and green ash (172 pounds per acre), and elm (169 pounds per acre).

[6]*A weighted average based on the number of plots sampled in each forest type and the biomass of each species in the type, including types in which the shrub species was not found.*

Poison ivy produces the greatest average biomass among low shrubs (109 pounds per acre green weight), followed by Virginia creeper (97 pounds per acre), raspberry-blackberry (86 pounds per acre), and honeysuckle (43 pounds per acre).

FUTURE TIMBER SUPPLY PROJECTED

The results of this third forest inventory of Indiana show that net annual growth of growing stock stood at 153.6 million cubic feet in 1985, up from 103.5 million in 1966. During this same period timber removals from growing stock increased from 64.9 million cubic feet in 1966 to 92.8 in 1985. The volume of growing stock in Indiana rose from 3.7 billion cubic feet in 1967 to 5.2 billion in 1986. The area of timberland in the State rose from 3.9 million acres in 1967 to 4.3 million in 1986.

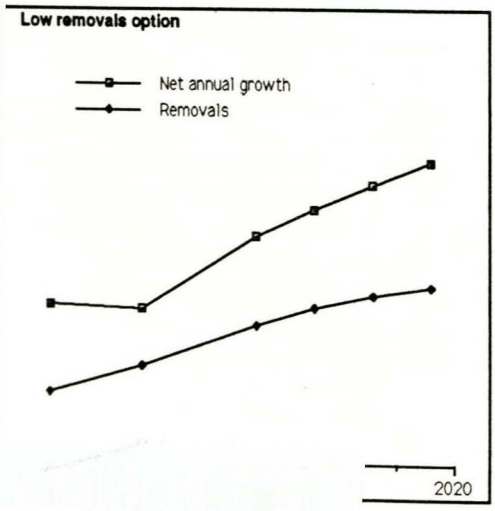
With these past trends as prologue, we now confront the question of what might be expected to happen in the coming 30 years. In this section we present two projections of inventory, growth, and removals: a low removals option and a high removals option. The high removals projection is based on the assumption that timber removals will continue to increase at about the same rate as over the past 36 years. The low removals projection assumes that increases will be more modest. Three additional assumptions are common to both projections. The first is that despite the gradual increase in timberland over the past 36 years, the area of timberland in Indiana will decline slightly to 4.1 million acres in 2016. Most of this decline will occur as a result of increasing urbanization, primarily in the northern more heavily populated part of the State. The second assumption is that the rate of net annual growth of growing stock will remain at 2.9 percent of inventory. The final assumption is that there will be no major changes in the economic, social, or political climate.

Low Removals Option Projection

In this projection timber removals will increase 28 percent from 92.8 million cubic feet in 1986 to 119.0 million in 2016 (fig. 18). This slight increase in removals causes a significant increase in the timber inventory and in realized growth. The inventory rises from 5.2 billion cubic feet in 1986 to 7.0 billion in 2016. Net annual growth increases from 153.6 million cubic feet in 1986 to 203.3 million in 2016. Thus, in this projection the ratio of growth to removals remains nearly constant.

High Removals Option Projection

In this projection removals nearly double over the projection period. By 2016 removals stand at



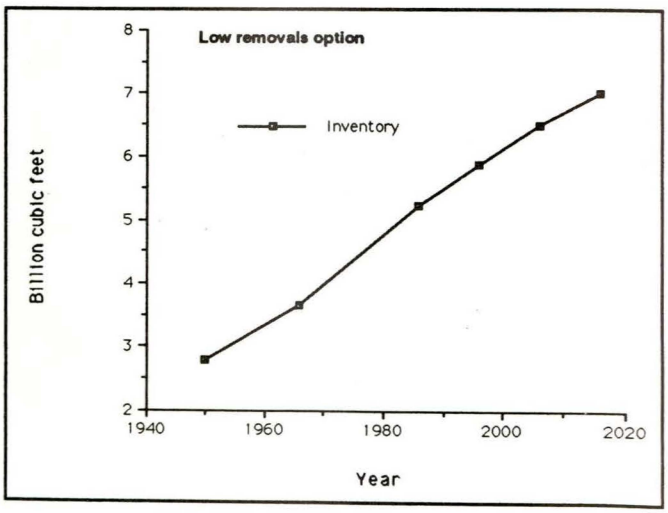


Figure 18.—*Removals, net growth, and inventory of growing stock in Indiana, 1950-1986, and low removals projection for 1987-2016.*

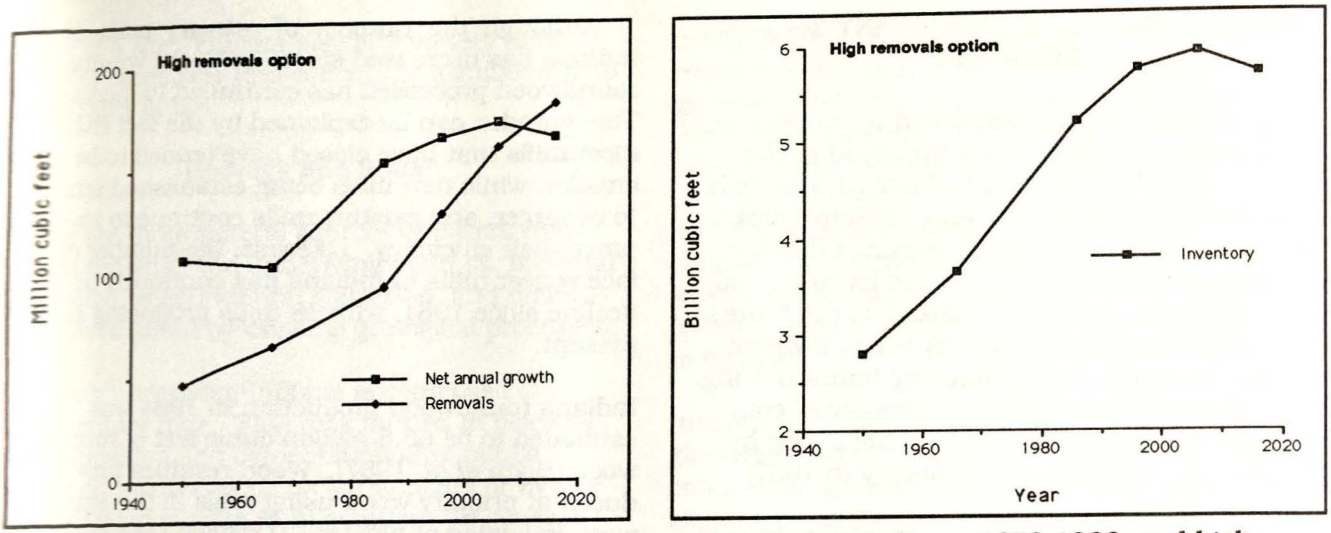


Figure 19.—*Removals, net growth, and inventory of growing stock in Indiana, 1950-1986, and high removals projection for 1987-2016.*

181.5 million cubic feet (fig. 19). Net annual growth however, rises modestly to 172.5 million in 2006. Then, as a result of the decrease in timberland, it declines to 165.5 million cubic feet in 2016. By 2011 removals exceed growth. The inventory increases to 5.9 billion cubic feet in 2006 and then declines to 5.7 billion in 2016.

These two projections represent the bounds within which we expect the actual future situation to develop. As the two diverge the future becomes more uncertain. In the first decade we feel that changing economic and social conditions will have less opportunity to invalidate the projections. Beyond the first decade it becomes less likely that all the assumptions upon which either of the projections is based will be realized.

These projections, also, do not depict desirable silvicultural or management objectives. Rather they represent what is likely to occur given the assumptions and biology of the resource. As these projections indicate, there is a real prospect that timber removals could exceed growth in many parts of Indiana in the long term. Will this prospect spur increased forest management? More than 87 percent of the State's timberland is held by nonindustrial private owners. Historically these owners have not engaged in forest management of their lands for a number of reasons. In Indiana, improving the resource will require that private owners practice active forest management. To accomplish this will require an increased education, information and assistance program for landowners. An added inducement to forest management, however, may be the prospect of a declining supply of timber. As supplies dwindle, prices of acceptable and available timber should rise. As owners contemplate an expected rise in stumpage prices, they may become more aware of the value of their timberland. As this happens they are also likely to become interested in ways to increase its value beyond what nature alone can do.

For these reasons the scenario that we see evolving over the next 30 years is a modest rise in stumpage prices in real terms accompanied by a modest increase in forest management by nonindustrial private owners. We do not expect that removals will exceed growth over widespread areas or over a range of species. This does not, however, rule out isolated instances of overcutting of particular species. In fact, current timber removals in 1985 were greater than growth for other white oaks, select red oaks, other red oaks, and elm.

FOREST PRODUCTS IMPORTANT TO THE ECONOMY

Nearly 44,000 Hoosiers employed by more than 1,000 businesses owed their livelihood to the forest resources of Indiana in 1982 (U.S. Department of Commerce 1985). As a collective group, the Indiana forest products industries (lumber and wood products, furniture and fixtures, and paper and allied products) ranked as the State's sixth largest employer in terms of employment and payroll within manufacturing industries (fig. 20). The three forest products industries combined generated $2.4 billion in value added by manufacture to the State's economy in 1982.

More than 300 primary wood-using industries in Indiana purchased unprocessed forest products in 1984 (Blyth *et al.* 1987). Examples of primary industries in Indiana include sawmills, veneer mills, handle plants, cooperage mills, one pulp mill, and specialty mills. The remaining 600+ firms are categorized as secondary industries that utilize primary wood products in the process of manufacturing consumer goods. Examples of secondary industries include furniture, cabinet and novelty manufacture, finished paper, millwork, and other specialty manufactured goods.

Figure 20.—*Indiana's forest products industry paid $673.8 million in wages to employees in 1982, and annually purchases standing trees worth an estimated $50 million from State landowners.*

Although the number of primary mills in Indiana has decreased since 1966, the volume of roundwood processed has continued to increase. This paradox can be explained by the fact that most mills that have closed have tended to be smaller, while new mills being established tend to be larger, and existing mills continue to improve their efficiency. Likewise, the number of face veneer mills in Indiana has continued to decline since 1961, with 18 mills producing at present.

Indiana roundwood production in 1984 was estimated to be 65.6 million cubic feet of roundwood (Blyth *et al.* 1987). Wood residues produced at primary wood-using mills in the State were estimated at almost 1.0 million tons green weight in 1984. More than 90 percent of the residue is utilized in such products as pulpwood chips, livestock bedding and mulches, residential firewood, fiber products, industrial fuel, and soil conditioners.

NONTIMBER RESOURCES DISCUSSED

Timber is a forest resource that is relatively easy to measure and whose impact in the marketplace can readily be assessed. The quantity and values of other forest resources are often difficult to estimate. Forest recreation, for example, is often produced jointly with other forest products (perhaps timber and water), which makes it difficult to separate costs and returns specific to recreation. And the forest wildlife resource is mobile and can move in and out of the sampling area, which makes an accurate census difficult to obtain.

Despite these difficulties, the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378) directs the Department of Agriculture to conduct inventories of all outputs from the Nation's forests and rangeland, to analyze present and anticipated supplies and demand, and to suggest opportunities for improving yields.

Indiana's citizens enjoy a wide range of outdoor recreational activities at many diverse facilities. Forests play a direct or indirect role in many of these activities or facilities. Forests may serve to heighten the enjoyment of the recreational experience by influencing water quality, providing wildlife habitat, and increasing the esthetic

value of a site. Forests also add variety to the Hoosier landscape and contribute significantly to the quality of life.

Geology and Soils[7]

There are three general sources of parent material in Indiana: the underlying bedrock, material deposited by continental glaciation, and materials moved about by ongoing geological processes.

Bedrock underlying Indiana is composed of sedimentary rock. This rock formed in place by the deposition and cementation of minerals, shells of organisms, or rock fragments or by the precipitation of salts from solution. In general, Indiana bedrock is youngest on the west side of the State and oldest on the east side (Indiana Department of Natural Resources 1984). All of Indiana's bedrock layers dip gently, slanting to the west and southwest. The youngest bedrock was formed more than 220 million years ago (MYA) in the western part of central and southern Indiana and is known for its coal deposits. The oldest bedrock, formed more than 360 MYA, is found in southeastern Indiana.

In the past one-half million years Indiana has been influenced by continental glaciers, similar to ice sheets that cover much of Antarctica. These vast ice sheets are thought to have been as much as 3 kilometers thick in Indiana. Continental glaciation was caused by climatic fluctuations and by the same uplifting movements in the earth's crust that formed mountains on the North American continent. These basic changes caused continental glaciers to form in Canada and spread across the northern Midwest.

There were four known glacial episodes: the Nebraskan, Kansan, Illinoian, and Wisconsinan. Only the latter three are thought to have altered Indiana's topography. The second glacial episode, the Kansan, covered most of Indiana, and the material it deposited is considered the oldest glacial drift found in the State. The last glacial episode, the Wisconsinan, began about 70,000 years ago and achieved maximum coverage of Indiana 21,000 years ago.

[7]*Source for this section is Indiana Department of Natural Resources, 1984.*

Interglacial periods were characterized by warm temperatures, land dissection by streams, and general weathering of the landscape formed by the previous ice age. The influence of continental glaciation on the soils of Indiana is highly significant and has given Indiana some of the most fertile soils in the world. The glaciers are responsible for depositing material (glacial drift) that was composed of material scraped and moved from the area of the glacier's origin and laid down in Indiana.

Indiana is divided into two general areas: the glaciated areas that were covered by one or more continental glaciers, and unglaciated areas. Most of the State has been affected by glaciation. However, a finger-shaped area in the south-central part of the State (Knobs Unit) is unglaciated. The soils in the unglaciated area are residual soils; that is, they were formed in place over bedrock. In this region, bedrock outcroppings are common and the influence of glaciers is minimal. However, many of the soils in this area are covered by a cap of wind blown glacial material or loess.

The recently glaciated areas, which occur primarily over the northern two-thirds of the State, tend to be of higher potential productivity and are composed of younger soils. The unglaciated areas tend to be composed of soils that have been exposed to the weathering/leaching process for longer periods and are, therefore, of lower relative productivity. Potential managed forest productivity in Indiana ranges from about 600 board feet (International 1/4-inch rule) per acre per year for younger soils to about 135 board feet per acre per year for older, weathered soils in south-central Indiana.

Topography affects soil profile development primarily through its influence on water movement. On steep sites, water is more inclined to run off rather than percolate down through the soil horizons. This runoff moves surface materials from one location to another, affecting soil profiles at both the erosion site and the site of deposition. Water that runs off an area is not available to percolate down through the soil and, therefore, is not available for plant growth. Drier sites produce less total biomass, and consequently organic matter accumulates more slowly.

Generally, steep slopes retard soil profile development, causing sloping soils to have thinner surface layers, less organic matter, and less conspicuous differentiation between soil layers than soils on level ground.

The rate of soil development is also affected by the type of vegetation present. Most of Indiana's soils were formed under forested conditions. However, grasses played a significant role in soil development in some areas (such as prairies). In soils that formed under grassland, organic matter content is greater and is more uniformly distributed through the soil profile than in soils that formed under forest. Forest soils are lower in organic matter, which tends to be concentrated in the surface layers. Except for poorly drained soils, leaching of organic matter and clay particles occurs more rapidly in forest soils. As a result, soils formed under forests generally appear to be more weathered.

Fish and Wildlife[8]

Wildlife is an important forest resource of interest to almost everyone. Approximately 365 species of birds, 54 species of mammals, and 84 species of amphibians and reptiles have been recorded in Indiana (Indiana Department of Natural Resources 1981). Of these, 166 kinds of birds and presumably all of the mammals, amphibians, and reptiles breed or formerly bred in the State. The remaining 199 species of birds occur or previously occurred as winter residents, spring and fall migrants, non-breeding summer visitors, or accidental visitors. The importance of forest land to wildlife in Indiana is shown by the number of species that breed in woodland versus other habitats.

Of 238 common Indiana species of mammals, breeding birds, reptiles and amphibians, fully 52 percent (124 different species) use forest land as their principal breeding habitat. An additional 38 percent use forest edge or reverting lands as their principal breeding habitat. The required or preferred habitat of many wildlife species includes more than one habitat type. For example, many woodland animals require some brushland, openland, or water to successfully live and reproduce.

Another major consideration in assessing the importance of forest land to Indiana wildlife is the average density of wildlife populations and the total amount of wildlife on forest land as compared with the same measures on other habitat types. Breeding bird censuses have shown that forest land generally supports more nesting birds per acre than any other habitat type, and that 40 percent of Indiana's 97 million breeding birds nest on forest land. Winter bird counts indicate that forest land generally supports more wintering birds per acre than any other habitat type except brushland and orchard, and that 20 percent of Indiana's 34 million wintering birds live on forest land. These counts also show that more birds winter in forest land than in any other habitat type in the State. Scores of additional bird species and millions of individuals depend partly or completely on forest land during spring and fall migrations.

One species of snake, nine species of birds, and twelve species of mammals have been extirpated from Indiana in recent history. Of these 22 extirpated species, 16 species depend either partly or fully upon forest land for their survival. Three kinds of birds and eight kinds of mammals are designated as endangered in Indiana. All of the endangered species in the State depend at least partly on forest land for their survival.

More people use public wildlife areas and refuges for non-consumptive, wildlife-oriented recreation than for hunting, fishing, and trapping. No data are available on statewide use of public or private forest land by birdwatchers, wildlife photographers and other wildlife observers.

Hunting is a very popular recreational activity in Indiana, with 14 percent of the population participating at least once per year. About 248,000 hunting licenses were sold in Indiana in 1987-1988, which accounted for more than $3 million in license revenue (Indiana Department of Natural Resources 1988). Although more than 400,000 acres of public land are available for hunting, the private landowner provides the bulk of the land for this sport.

[8]*Sources for this section are Indiana Department of Natural Resources, 1981 and 1988.*

The most popular game animals in Indiana's forests include white-tailed deer, eastern wild turkey, fox and gray squirrels, and the cottontail rabbit. Other species such as the bobwhite quail, ruffed grouse, raccoon, and wood duck are taken in lesser amounts. Due to hunting pressures, all of the mentioned species are subjects of habitat management and research.

Furbearing animals continue to have economic importance, as evidenced by the purchase of more than 11,000 trapping licenses in Indiana in 1987-1988. The primary species taken include raccoon, opossum, red and gray fox, coyote, beaver, muskrat, and mink. Most of these furbearing species rely on forest land for habitat.

Although opportunities for fishing are relatively limited in Indiana, the sport continues to be popular, with 549,000 licenses sold in 1987-1988. About 165 endemic species of fish exist in various aquatic habitats.

A single wind-thrown tree, a tree overhanging a stream with its roots exposed to water's action, or overhanging vegetation can be a tremendous benefit to animal life in a stream. The momentarily slowed water will deposit suspended silt particles as well as be slightly lower in temperature than water in unshaded areas. This clearer, cooler water is preferred by game fish species. Turbulence caused by stream obstructions can create pools, and the resulting downstream riffle serves to oxygenate the stream's water, thereby improving habitat for fish and the aquatic organisms on which they feed. The exposed roots or overhead tree trunks offer cover for a variety of aquatic animals in addition to fish.

These effects of one tree on a stream are magnified manyfold by a forest encompassing all or part of a watershed. Runoff is slowed by forest vegetation, reducing stream siltation. The forest canopy, by shading the stream, helps to maintain cool water and high levels of dissolved oxygen. The forest vegetation and soils intercept vast quantities of phosphates and nitrates, as well as herbicides and pesticides from adjacent agricultural and developed areas, before they reach and pollute waterways. Excessive amounts of phosphates and nitrate accelerate the natural aging of lakes, while large pesticide concentrations harm the sensitive micro-ecosystems on which all fish populations depend.

Certain tree species, such as oaks and pines, make the soils in which they grow more acidic. Lakes and streams in watersheds in which these species predominate are likely to become more acidic over time, thereby affecting fish habitat by favoring species that prefer more acidic water. The leaf litter of forests harbors many valuable fish foods in the form of slugs, snails, worms, and other invertebrates. This litter layer may also be the source of carbonic acid that leaches into streams, again affecting pH and dissolved oxygen levels as well as coloring the water amber. If this decaying leaf litter becomes too abundant in an aquatic habitat, however, its decomposition may reduce dissolved oxygen levels.

Forest areas adjacent to streams, lakes, cropland, and idle lands generally support particularly diverse wildlife communities and help protect water quality. Sound land use management and cautious forest management are paramount if fish and wildlife communities are to be maintained or improved.

Outdoor Recreation[9]

Indiana's forest lands provide a wide range of recreational opportunities at diverse types of facilities and areas. There are approximately 730,614 acres of publicly owned land and water recreational areas in Indiana, accounting for 3.2 percent of the total land area of the State (Indiana Department of Natural Resources 1988). Given a State population of about 5.5 million citizens, the amount of recreation land available to each person is only about one-eighth of an acre. The recreation area per person is least in the central part of the State (22 people/recreation acre) and greatest in the southern part (3 people/recreation acre).

Of the total land and water recreation areas, 328,251 acres are classified as forest recreation areas. Although this forest recreation area is less than 1 percent of the total State acreage, it accounts for the largest percentage (47 percent) of the total recreational acreage.

Almost all of the publicly owned forest recreational land is held by the Federal and State

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[9]*Source for this section is Indiana Department of Natural Resources, 1988.*

governments. Private sector forest recreation land does exist, although statistics on these lands are limited. Of the approximately 120 dedicated nature preserves in the State, about 45 are held by conservation organizations such as the Indiana Audubon Society, the Nature Conservancy, and Acres, Inc.

Principal activities on forest recreation land include hunting, hiking, backpacking, picnicking, horseback riding, camping, snowmobiling, cross country skiing, birdwatching, nature interpretation, and research. Multiple use management prevails on most of the forest recreation areas in the State; a preservation philosophy exists on the 120 dedicated nature preserves, the 12,935-acre Charles C. Deam Wilderness Area on the Hoosier National Forest, and the 19 State Parks.

Recreation interests are guided by a plan designed to determine, promote, and implement a statewide coordinated program enabling quality recreational opportunities. This plan functions as a guide for acquiring, developing, and managing recreation areas, and meets the requirements of eligibility for the Federal Land and Water Conservation Fund Act of 1965. The title of this document composed by the Indiana Division of Outdoor Recreation is: "Indiana Outdoor Recreation, 1989, An Assessment and Policy Plan."

In 1986, the Indiana Department of Natural Resources, Division of Outdoor Recreation, began to assemble an inventory of all Indiana's publicly owned outdoor recreation areas. This inventory was the first major update of the "1976 Inventory of Outdoor Recreation Facilities." In the process of updating the 1976 inventory, several changes were made to make the data more useful. Some of these changes were major. Consequently, the current data are not easily comparable to the data in the 1976 inventory.

Most of the inventory is made up of public sector facilities. Areas operated by park agencies, as well as non-park agencies, are included. Because public school and university facilities are often available for public use, they also are included in the inventory. Tables 4, 5, and 6 show outdoor recreation area acreages as of February 1988.

Table 4.—*Area of public land and water recreation areas, by category and region, Indiana, 1988*

Category	North	Central	South	Statewide
Public sector (acres)	102,339	94,671	500,491	697,501
Public schools/universities (acres)	8,967	15,513	8,633	33,113
Total recreation acres	111,306	110,184	509,124	730,614
Total land area (acres)	5,102,707	8,876,435	9,179,482	23,158,625
Recreation area (percent)	2.2	1.2	5.5	3.2
Population (number)	1,753,005	2,381,006	1,363,921	5,497,932
Recreation acres/ 1,000 persons	63	46	373	133
People/recreation acre	16	22	3	8

Table 5.—*Number of acres and number of recreation areas by area type for type of owner/operator, Indiana, 1988*

Area type	Federal		State		County		Township		Municipal		Total	
	Acres	*No. areas*	*Acres*	*No. areas*	*Acres*	*No. areas*	*Acres*	*No. areas*	*Acres*	*No. areas*	*Acres*	*No. areas*
Park/recreation	15,474	9	58,731	27	15,724	184	578	28	44,370	1,790	135,186	2,070
Forest	186,206	4	141,760	14	240	2	—	—	45	1	328,251	21
Fish/wildlife	7,744	2	97,903	40	200	6	—	—	57	3	105,904	51
Fishing/boating access site	132	11	263	166	10	7	—	—	27	17	433	203
State dedicated Nature preserve	—	—	10,867	66	530	6	—	—	503	9	11,900	81
Reservoir	—	—	114,369	10	—	—	—	—	1,800	8	116,169	18
Historic/cultural	210	2	877	18	437	9	2	1	16	22	1,567	53

Table 6.—*Number of public sector recreational areas offering each type of activity/facility, by region, Indiana, 1988*

(In number of areas)

Activities/facilities	North	Central	South	Statewide
Boating	196	68	157	421
Waterskiing	21	7	35	63
Canoeing	156	52	108	316
Fishing	307	127	209	643
Picnicking	563	513	407	1,483
Camping	31	37	80	148
Playground	525	495	352	1,372
Swimming beach	51	18	30	99
Swimming pool	49	73	65	187
Tennis courts	199	203	135	537
Softball/baseball	305	317	211	833
Football/soccer	77	81	35	193
Basketball	312	336	205	853
Golf	19	23	19	61
Miniature golf	1	10	5	16
Handball/racquetball	5	1	5	11
Horseshoe courts	109	118	89	316
Shuffleboard courts	48	32	16	96
Volleyball	87	101	62	250
Foot trails	102	98	98	298
Fitness trails	41	27	14	82
Bike trails	11	19	8	38
Horse trails	6	7	23	36
ORV trails	—	—	—	—
Backpacking	1	4	8	13
Group camp buildings	3	1	7	11
Cabins	4	5	7	16
Inns	1	1	5	7
Hunting	19	11	39	69
Shooting range	9	7	5	21
Archery range	19	6	10	35
Zoo	3	1	2	6
Nature interpretation	49	33	43	125
Nature center	15	5	15	35
Cultural/historic interpretation	14	17	25	56
Visitor center	8	3	14	25
Amphitheaters	23	12	22	57
Snowmobile trails	3	5	—	8
Ice skating	92	32	12	136
Cross-country skiing	56	16	2	74
Downhill skiing	—	—	—	—
Sledding/tobogganing	35	13	1	49
No activities/facilities	139	77	57	273

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APPENDIX

ACCURACY OF THE SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Survey Unit levels. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that if a 100-percent inventory had been taken, using the same methods, the results would have been within the limits indicated.

For example, the estimated growing-stock volume in the State in 1986, 5,217.9 million cubic feet, has a sampling error of ±1.57 percent (±81.9 million cubic feet). The growing-stock volume from a 100-percent inventory would be expected to fall between 5,136.0 and 5,299.8 million cubic feet (5,217.9 ±81.9), there being a one in three chance that this is not the case.

Table 7 shows the sampling errors for the 1986 Indiana Forest Inventory:

Table 7.—*Sampling errors for State totals of volume, growth, average annual removals, and timberland area, Indiana, 1986*

Item	State totals	Sampling error
Growing stock	*Million cubic feet*	*Percent*
Volume (1986)	5,217.9	1.57
Growth (1985)	142.1	3.42
Average annual removals (1966-1985)	72.6	5.40
Sawtimber	*Million board feet*	
Volume (1986)	19,224.2	1.86
Growth (1985)	729.1	5.47
Average annual removals (1966-1985)	314.0	5.68
Timberland	*Thousand acres*	
Area (1986)	4,295.8	1.00

As survey data are broken down into sections smaller than State or Survey Unit totals, the sampling error increases. For example, the sampling error for timberland area in a particular county is higher than that for total timberland area in the Unit. Table 39 shows the sampling errors for Unit and county totals. To use this table for data smaller than county totals, use the following formula to compute error estimates:

$$E = \frac{(SE)\sqrt{\text{(Unit total area or volume)}}}{\sqrt{\text{(Volume or area smaller than Unit total)}}}$$

where:

E = sampling error in percent
SE = Unit total error for area or volume

For example, to compute the error on the area of oak-hickory type in Jackson County, proceed as follows:

Area of oak-hickory type in Jackson County from table 14 = 50,300 acres

Area of all timberland in the Knobs Unit from table 14 = 1,741,100 acres

Unit total error for area in the Knobs Unit from table 39 = 0.83 percent

Using the formula above:

$$\text{Error} = \frac{(0.83)\sqrt{1{,}741{,}100}}{\sqrt{50{,}300}}$$

$$= \pm 4.88 \text{ percent}$$

SURVEY PROCEDURES

Two-phase sampling using both new and remeasurement ground plots was used in this inventory. The major steps in the Indiana Forest Inventory were as follows:

1. Aerial photography (Phase 1)

   Aerial photographs of the entire area were obtained from the Hoosier National Forest and USDA Agricultural Stabilization and Conservation Service. Nine-inch square, black and white Panchromatic prints on a scale of 1:40,000 were used throughout the entire State. Approximate date of photography for each county is shown in table 8. For those counties with photos taken before 1980, National High Altitude Photography (NHAP) photos were used to verify change information. The NHAP photos were taken between 1981 and 1983.

The locations of the plots used in the 1967 inventory were transferred to these new photographs. Photographs were assembled into township mosaics, and a systematic grid of 121 one-acre points (each point representing approximately 190.4 acres) was overlaid on each township mosaic. Each of these points (both the new systematic grid points and the old sample plots) was examined by aerial photogrammetrists and classified stereoscopically based on land use. If trees were present, forest type and stand size-density class were recorded. Then all the old sample locations and a sample of the new points were sent to the field for the field crew to verify the photo classification and to take further measurements. A total of 126,629 points (120,949 new and 5,680 old) was examined stereoscopically (table 9).

2. Plot measurements (Phase 2)

   Each plot location was visited on the ground by a Forest Service field crew. The crew classified the plot based on its current land use and recorded various other descriptive information. Table 10 summarizes the results of this step of the inventory:

Table 8.—*Dates of aerial photography by county and Forest Survey Unit, Indiana*

Unit and County	Date	Unit and County	Date
Lower Wabash Unit		**Northern Unit**	
Clay	10-80	Adams	4-83
Daviess	9-74	Allen	5-81
Gibson	10-74	Bartholomew	11-80
Greene	10-80	Benton	6-83
Knox	4-78	Blackford	9-80
Martin	9-74	Boone	5-72
Parke	6-71	Carroll	11-81
Pike	9-74	Cass	4-82
Posey	6-80	Clinton	5-72
Putnam	4-78	Decatur	10-81
Sullivan	9-74	DeKalb	6-72
Vanderburgh	6-80	Delaware	6-80
Vermillion	9-72	Elkhart	5-81
Vigo	9-74	Fountain	6-83
		Fulton	10-80
		Grant	6-80
		Hamilton	5-82
		Hancock	5-80
Knobs Unit		Hendricks	4-78
Brown	10-80	Henry	6-80
Clark	10-81	Howard	5-84
Crawford	11-79	Huntington	4-82
Dubois	11-79	Jasper	4-84
Floyd	6-80	Jay	9-80
Harrison	6-80	Johnson	9-72
Jackson	10-80	Kosciusko	7-73
Lawrence	9-79	LaGrange	10-74
Monroe	10-80	Lake	9-73
Morgan	10-80	LaPorte	11-81
Orange	9-79	Madison	6-80
Owen	10-80	Marion	8-71
Perry	11-79	Marshall	7-73
Scott	10-80	Miami	10-80
Spencer	9-74	Montgomery	7-71
Warrick	6-80	Newton	6-82
Washington	10-80	Noble	7-73
		Porter	6-82
		Pulaski	5-81
		Randolph	9-80
		Rush	10-81
Upland Flats Unit		St. Joseph	10-80
Dearborn	7-80	Selby	6-80
Fayette	10-81	Starke	5-81
Franklin	10-71	Stueben	7-73
Jefferson	10-80	Tippecanoe	6-71
Jennings	10-81	Tipton	6-72
Ohio	7-80	Wabash	6-72
Ripley	10-81	Warren	6-83
Switzerland	7-80	Wayne	10-80
Union	10-81	Wells	6-72
		White	4-82
		Whitley	6-72

Table 9.—*Aerial photo points classified by photo land class and Forest Survey Unit, Indiana, 1986*

Photo land class	Forest Survey Unit				
	All Units	Lower Wabash	Knobs	Upland Flats	Northern
Timberland	24,462	4,794	9,665	2,840	7,163
Reserved timberland	830	61	223	176	370
Questionable	645	90	307	73	175
Nonforest with trees	3,842	871	639	454	1,878
Nonforest without trees	95,572	13,931	11,834	5,423	64,384
Water	1,178	285	265	77	651
All classes	126,629	20,032	22,933	9,043	74,621

Table 10.—*Number of ground plots by ground land use class and Forest Survey Unit, Indiana, 1986*

Survey Unit and ground land use class	Old plots remeasured	New plots established	Total ground plots taken
All Units			
Timberland	1,059	939	1,998
Reserved timberland	27	115	142
Nonforest with trees	230	228	458
Nonforest without trees	4,308	4,416	8,724
Water	61	57	118
Total	5,685	5,755	11,440
Lower Wabash Unit			
Timberland	205	208	413
Reserved timberland	6	12	18
Nonforest with trees	55	43	98
Nonforest without trees	600	648	1,248
Water	14	12	26
Total	880	923	1,803
Knobs Unit			
Timberland	460	409	869
Reserved timberland	12	45	57
Nonforest with trees	65	62	127
Nonforest without trees	503	525	1,028
Water	16	16	32
Total	1,056	1,057	2,113
Upland Flats Unit			
Timberland	127	121	248
Reserved timberland	0	37	37
Nonforest with trees	27	36	63
Nonforest without trees	219	226	445
Water	7	2	9
Total	380	422	802
Northern Unit			
Timberland	267	201	468
Reserved timberland	9	21	30
Nonforest with trees	83	87	170
Nonforest without trees	2,986	3,017	6,003
Water	24	27	51
Total	3,369	3,353	6,722

On those plots classified as timberland, wooded pasture, or windbreak (at least 120 feet wide), a ground plot was established or remeasured. The ground plot consisted of a 10-point cluster covering approximately 1 acre. At each point, trees 5.0 inches or more in d.b.h. were sampled on a 37.5 Basal Area Factor (BAF) variable-radius plot, and trees less than 5.0 inches d.b.h. were sampled on a 1/300-acre fixed-radius plot.

3. Area estimates

Area estimates outside the Hoosier National Forest were made using two-phase estimation methods. In this type of estimation, a preliminary estimate of area by land use is made from the aerial photographs (phase 1) and corrected by the plot measurements (phase 2). A complete description of this estimation method is presented by Loetsch and Haller (1964). Estimates of area for a particular county are based on the aerial photo points taken in that county, corrected using all the ground plots in the Survey Unit, regardless of the county in which they were taken. This was done because there were not enough ground plots in any one county to accurately correct the aerial photo interpretation in that county. Unit-wide correction rates should be accurate at the county level because we have made every effort to ensure that the plot interpretation is consistent throughout each Survey Unit.

Area estimates within the Hoosier National Forest were obtained from compartment examination records maintained by the Forest Timber Management Staff. This is an intensive area inventory system in which, over a period of years, each stand in the Hoosier is mapped on aerial photographs and then classified by ground visits.

4. Volume estimates

Estimates of volume per acre are made from the trees measured on the 10-point plots. Estimates of volume per acre were multiplied by the area estimates to obtain estimates of total volume. Net cubic foot volumes are based on equations developed by Smith and Weist (1982) for use in Indiana. Biomass estimates are based on equations developed by Smith (1985).

The Forest Service reports all board foot volume in International 1/4-inch rule. Conversion factors for local use rules are often useful. Board foot Doyle conversion factors were derived from full tree measurements taken throughout the Central States (Illinois, Indiana, Iowa, and Missouri) and an equation developed by Wiant and Castenaeda (1977). Factors (multipliers) to convert board foot International volumes in this report to Doyle board feet by diameter class and softwoods and hardwoods are shown in table 11:

Table 11.—*Factors to convert sawtimber volume in International 1/4-inch rule to volume in Doyle rule by diameter class and softwoods and hardwoods*

D.B.H. class (inches)	Doyle rule conversion factor	
	Softwoods	Hardwoods
9.0-10.9	0.3455	—
11.0-12.9	0.4780	0.4172
13.0-14.9	0.5992	0.5118
15.0-16.9	0.6908	0.5882
17.0-18.9	0.7685	0.6569
19.0-20.9	0.8573	0.7180
21.0-22.9	0.8645	0.7829
23.0-24.9	0.9276	0.8324
25.0-26.9	0.9493	0.8736
27.0-28.9	0.9710	0.9473
29.0+	1.1065	1.1349

5. Growth and mortality estimates

On remeasurement plots, estimates of growth and mortality per acre come from the remeasured diameters of trees and from observation of trees that died between inventories. Growth is reported for 1985, the last year before the inventory, and is based on an assumption of constant basal area growth over the remeasurement period. Mortality is reported for 1985 also, and is based on an assumption of constant volume mortality over the remeasurement period.

On new plots, where trees were not remeasured, estimates of growth and mortality were obtained by using the Central States Stand and Tree Evaluation and Modeling System (STEMS) (Miner and Walters 1984, Shifley 1987) to project the growth and mortality of

trees for 1 year. The STEMS growth model was adjusted to meet local conditions, using the data from the remeasured plots and a method developed by Smith (1983). As with volume, total growth and mortality estimates were obtained by multiplying the per acre estimates by area estimates.

6. Average annual removals estimates

Average annual growing-stock and sawtimber removals (1966 to 1985) were estimated only from the remeasurement plots. These estimates are obtained from trees measured in the last survey and cut or otherwise removed from the timberland base. New plots were not used to estimate removals. Because the remeasurement plots made up only half of the total ground plots, average annual removals estimates have larger sampling errors than volume and growth estimates.

7. Timber removals, utilization, and timber product output estimates

Statistics on timber product output during 1984 came from canvassing (with a formal questionnaire) all the known primary wood-using mills that consume Indiana logs and bolts. Indiana Department of Natural Resources (IDNR) foresters personally canvassed all the known Indiana primary mills (except one pulpmill). IDNR utilization and marketing specialists provided estimates based on prior knowledge and contacts for a few mills that did not furnish complete data.

The North Central Forest Experiment Station mailed a formal questionnaire to the only Indiana pulpmill and all known out-of-State mills using Indiana roundwood. Follow-up on nonrespondents was by mail and telephone.

A sample of Illinois households and fuelwood producers provided estimates of fuelwood and post production in Illinois during 1983. Fuelwood and fencepost output in Indiana for 1984 was estimated by extrapolating the study results in Illinois to Indiana.

Wood utilization factors for converting timber products output to removals from growing stock were obtained during a 1984-1985 utilization study in Illinois, a 1971-1972 utilization study in Missouri, a 1966 utilization study in Indiana, and a 1964-1965 utilization study in Michigan.

Because this was a 100-percent sample of all primary wood-using mills, there is no sampling error reported for 1985 removals and timber products. This is not to say that the estimates reported here are totally accurate. Sampling error is a measure of precision, not accuracy, and tells in what range we would expect to obtain an estimate were we to repeat the procedure on a new sample. Because we sampled all mills, we would expect the same results if we repeated the procedure.

COMPARING INDIANA'S THIRD INVENTORY WITH THE SECOND INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. However, changes in procedures and definitions between surveys often make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check was made for the Indiana inventory to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

Identifying and Correcting Procedural Changes

Between the 1967 and 1986 inventories of Indiana, some procedural changes were made in the method of deriving annual growth and mortality estimates and determining forest type. Also, different volume equations and forest types were used for the two inventories.

New volume equations were developed for Indiana, and these equations were used to compute the 1986 volumes and also to recompute the 1967 volume. The recomputed 1967 growing-stock volume averaged 4.3 percent greater than that reported in the 1967 report. Volumes for 1967 shown in this report are the recomputed volumes based on new volume equations and observations from the 1967 inventory.

Mortality figures published in the 1967 inventory report were based on field estimates from nonremeasurement plots. Information gathered on remeasurement plots during the current inventory was used to adjust the 1967 mortality figures. This adjustment, together with the new volume equations, also changed the estimate of net growth for the 1967 inventory.

In the 1967 report, fewer forest types were identified than in this report; however, all the types used in this report are subsets of forest types used in the old report. Areas and volumes in the oak-hickory type in 1967 will be in either the oak-hickory, chestnut-scarlet oak, or sassafras-persimmon type in 1986. Areas and volumes in the oak-gum-cypress type in 1967 will be in either the oak-gum or lowland oak type in 1986. Similarly, the 1967 elm-ash-cottonwood type is made up of the elm-ash-soft maple and cottonwood types in 1986; and the 1967 maple-beech-birch type is made up of the maple-beech and cherry-ash-yellow-poplar types in 1986. We could not classify the 1967 area by the 1985 types, so all comparisons must be made by combining 1986 data to reflect the 1967 types.

Checking for Consistency

A test was made by means of a computer program for updating and projecting timber volume, growth, and removals to ensure that it was possible to move from the adjusted 1967 resource statistics to the 1986 values. Using the adjusted 1967 volume, growth rates, and removals rates for the period between the two surveys, the program projected the inventory from 1967 to 1986. The program outputs volume, net growth, and removals of growing stock for every year in the period. Thus, inconsistencies in volume, growth, and removals were identified and resolved.

This program estimates how volume, growth, and removals could have logically changed over the inventory period to be consistent with the estimates of past and current volume, growth, and removals and average annual removals presented in this report. The growing-stock growth used for this program was increased by 6.1 million cubic feet per year in both 1967 and 1986 to account for nontimberland that converted to timberland. Between 1967 and 1986, we found that about 900,000 acres of nontimberland converted to timberland. The current growing-stock volume on this land is 514 million cubic feet. Removals did not require adjustment because they already include "other" removals (see Definition of Terms in Appendix), which includes the volume of timber on land that converted from timberland to nontimberland. Between 1967 and 1986, we found that about 500,000 acres of timberland converted to nontimberland. The growing-stock volume on this land was 400 million cubic feet in 1966.

LOG GRADE

In Indiana the butt log of every sawtimber sample tree was graded for quality. Additionally, all logs in a smaller sample of trees throughout the State were graded. The volume yield by log grade for each tree in the latter sample was used to distribute the volume of trees in the former sample into log-grade classes by species group. The resulting volumes by log-grade classes were expanded to provide an estimate for the entire State.

Logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to "A guide to hardwood log grading" (Rast *et al.* 1973). The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Scaling diameter, inches		13-15[1]	16-19	20+	11+[2]		12+		8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep & crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			50 percent
	For logs with more than one-fourth of end in sound defects		10 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41- to 60-percent deductions can be #2.
[6]Otherwise #2 logs with 51- to 60-percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree	Butts and uppers
Min. diameter, small end	8 inches +
Min. length without trim	8 feet
Clear cuttings	No requirements
Sweep allowance	One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects:	
Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of the log diameter at point of occurrence.
Whorled knots	Any number, if the sum of knot diameters above the callus does not exceed one-third of the log diameter at point of occurrence.
Holes	Any number provided none has a diameter over one-third of the log diameter at point of occurrence, and none extends more than 3 inches into included timber[2].
Unsound surface defects :	Same requirements as for sound defects if they extend into included timber. No limit if they do not.
End defects:	
Sound	No requirements.
Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth the scaling diameter and will admit one longitudinal split not extending more than 5 inches into the included timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications:

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness on four faces
	Inches	*Feet*	*Percent*	*Percent*	*Number*	*Inches*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14+	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percent length (6 feet min. length)[3]
2	6+	8-16	30	50	0	Sound knots l.e.[4] D/6 and less than 3 inches[5] Unsound knots: l.e. 1-1/2 inches and for: butt logs l.e. D/12 upper logs l.e. D/10, or four faces clear 50 percent of length
3	6+	8-16	40	50	8-foot logs: 1 weevil 10-foot+ logs: 2 weevils	Sound knots l.e. D/3 and less than 5 inches Unsound knots l.e. D/6 and less than 2-1/2 inches
4	6+	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than 1/2-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) is less than or equal to half of the diameter of the log (inches).
[4]l.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

Log Grades for Jack Pine and Red Pine

Grade 1: Logs with three or four clear faces.[1]

Grade 2: Logs with one or two clear faces.

Grade 3: Logs with no clear faces.

After the tentative log grade is established from above, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third of the diameter inside bark at small end.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[1] A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than 1/2-inch in diameter, overgrown knots of any size, and holes more than 1/4 inch in diameter. Faces may be rotated to obtain the maximum number of clear ones.

Log Grades for All Other Softwood Logs

Grade 1

1. Logs must be 16 inches in diameter or larger, 10 feet in length or longer, and with deduction for defect not over 30 percent of gross scale.

2. Logs must be at least 75 percent clear on each of three faces.

3. All knots outside clear cutting must be sound and not more than 2-1/2 inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 10 feet in length or longer, and with a net scale after deduction for defect of at least 50 percent of the gross scale deducted for defect.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches in diameter or larger, 8 feet in length or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.

Note: A) Diameters are diameter inside bark (d.i.b.) at small end of log.
B) Percent clear refers to percent clear in one continuous section.

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilograms.
1 ton = 0.907 metric tons.

TREE SPECIES GROUPS IN INDIANA[10]

Softwoods

Jack pine ..... *Pinus banksiana*
Red pine ..... *Pinus resinosa*
White pine ..... *Pinus strobus*
Shortleaf pine ..... *Pinus echinata*
Other yellow pine
  Virginia pine ..... *Pinus virginiana*
Tamarack ..... *Larix laricina*
Baldcypress ..... *Taxodium distichum*
Eastern redcedar ..... *Juniperus virginiana*
Other softwoods
  Scotch pine ..... *Pinus sylvestris*

Hardwoods

Select white oak[11]
  White oak ..... *Quercus alba*
  Swamp white oak ..... *Quercus bicolor*
  Bur oak ..... *Quercus macrocarpa*
  Swamp chestnut oak ..... *Quercus michauxii*
  Chinkapin oak ..... *Quercus muehlenbergii*
Other white oak[11]
  Overcup oak ..... *Quercus lyrata*
  Chestnut oak ..... *Quercus prinus*
  Post oak ..... *Quercus stellata*
  Select red oak[11]
  Cherrybark oak ..... *Quercus falcata* var. *pagodifolia*
  Northern red oak ..... *Quercus rubra*
  Shumard oak ..... *Quercus shumardii* var. *shumardii*
Other red oak[11]
  Scarlet oak ..... *Quercus coccinea*
  Northern pin oak ..... *Quercus ellipsoidalis*
  Southern red oak ..... *Quercus falcata*
  Shingle oak ..... *Quercus imbricaria*
  Black oak ..... *Quercus velutina*
  Blackjack oak ..... *Quercus marilandica*
  Pin oak ..... *Quercus palustris*
Select hickory[11]
  Pecan ..... *Carya illinoensis*
  Shellbark hickory ..... *Carya lacinosa*
  Shagbark hickory ..... *Carya ovata*
  Mockernut hickory ..... *Carya tomentosa*
Other hickory[11]
  Bitternut hickory ..... *Carya cordiformis*
  Pignut hickory ..... *Carya glabra*
Birch[11]
  Yellow birch ..... *Betula alleghaniensis*
  River birch ..... *Betula nigra*
  Paper birch ..... *Betula papyrifera*
Hard maple[11]
  Black maple ..... *Acer nigrum*
  Sugar maple ..... *Acer saccharum*
Soft maple[12]
  Red maple ..... *Acer rubrum*
  Silver maple ..... *Acer saccharinum*
Ash[11]
  Black ash ..... *Fraxinus nigra*
  Blue ash ..... *Fraxinus quadrangulata*
  White ash ..... *Fraxinus americana*
  Green ash ..... *Fraxinus pennsylvanica*
Cottonwood[12] ..... *Populus deltoides*
Aspen[12]
  Bigtooth aspen ..... *Populus grandidentata*
  Quaking aspen ..... *Populus tremuloides*
  Balsam poplar ..... *Populus balsamifera*
Basswood[12]
  American basswood ..... *Tilia americana*
  White basswood ..... *Tilia heterophylla*
Beech[11] ..... *Fagus grandifolia*
Black walnut[11] ..... *Juglans nigra*
Black cherry[12] ..... *Prunus serotina*
Butternut[12] ..... *Juglans cinerea*
Elm
  Winged elm[12] ..... *Ulmus alata*
  American elm[12] ..... *Ulmus americana*
  Siberian elm[12] ..... *Ulmus pumila*
  Slippery elm[12] ..... *Ulmus rubra*
  Rock elm[11] ..... *Ulmus thomasii*

[10]*The common and scientific names are based on: Little, Elbert L. Checklist of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 375 p.*

[11]*This species or species group is considered a hard hardwood, with an average specific gravity greater than 0.50.*

[12]*This species or species group is considered a soft hardwood, with an average specific gravity of 0.50 or less.*

Hackberry[12] ..... *Celtis occidentalis*
Sycamore[12] ..... *Platanus occidentalis*
Yellow-poplar[12] ..... *Liriodendron tulipifera*
Black willow[12] ..... *Salix nigra*
Sweetgum[12] ..... *Liquidambar styraciflua*
Tupelo[12]
Black tupelo ..... *Nyssa sylvatica* var. *sylvatica*
Swamp tupelo ..... *Nyssa sylvatica* var. *biflora*
Persimmon[11] ..... *Diospyros virginiana*
Sassafras[12] ..... *Sassafras albidum*
Other hardwoods
Ohio buckeye[12] ..... *Aesculus glabra*
Boxelder[12] ..... *Acer negundo*
Kentucky coffeetree[11] ..... *Gymnocladus dioicus*
Black locust[11] ..... *Robinia pseudoacacia*
White mulberry[12] ..... *Morus alba*
Red mulberry[12] ..... *Morus rubra*
Flowering dogwood[11] ..... *Cornus florida*
Honeylocust[11] ..... *Gleditsia triacanthos*
Northern catalpa[11] ..... *Catalpa speciosa*
European alder[12] ..... *Alnus glutinosa*
White poplar[12] ..... *Populus alba*
Yellow buckeye[12] ..... *Aesculus octandra*
Noncommercial species
Osage-orange ..... *Maclura pomifera*
Eastern hophornbeam ..... *Ostrya virginiana*
Apple ..... *Malus* spp.
American hornbeam ..... *Carpinus caroliniana*
Wild plum ..... *Prunus* spp.
Eastern redbud ..... *Cercis canadensis*
Pawpaw ..... *Asimina triloba*
Hawthorn ..... *Crataegus* spp.
Ailanthus ..... *Ailanthus altissima*
Chokecherry ..... *Prunus virginiana*

DEFINITION OF TERMS

Average annual removals from growing stock.—The average net growing-stock volume in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other uses (see Other removals). Average annual removals of growing stock are reported for a period of several years (1966 to 1985 in this report) and are based on information obtained from remeasurement plots (see Survey Procedures in Appendix).

Average annual removals from sawtimber.—The average net board foot sawtimber volume of live sawtimber trees removed annually for forest products (including roundwood products and other uses [see Other removals]). Average annual removals of sawtimber are reported for a period of several years (1966 to 1985 in this report) and are based on information obtained from remeasurement plots (see Survey Procedures in Appendix).

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand is summed, the result is usually expressed as square feet of basal area per acre.

Biomass.—The above-ground volume of all live trees (including bark and foliage) reported in green tons. Biomass is made up of four components:

Bole.—Biomass of a tree from 1 foot above the ground to a 4.0-inch top outside bark.

Tops and limbs.—Total biomass of a tree from a 1-foot stump minus the bole.

1.0- to 5.0-inch trees.—Total above-ground biomass of a tree from 1.0 to 5.0 inches in diameter at breast height.

Stump.—Biomass of a tree 5.0 inches d.b.h. and larger from the ground to a height of 1 foot.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam, osage-orange, and redbud.)

Commercial forest land.—(See Timberland).

Cord.—One standard cord is 128 cubic feet of stacked wood, including bark and air space. Cubic feet can be converted to standard cords by dividing by 79.

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cropland.—Land under cultivation within the past 24 months; including cropland harvested,

crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improvement crops, but excluding land cultivated in developing improved pasture.

Cull.—Portions of a tree that are unusable for industrial wood products because of rot, missing or dead material, or other defect.

Diameter class.—A classification of trees based on diameter outside bark, measured at breast height (d.b.h.). Two-inch diameter classes are commonly used in Forest Inventory and Analysis, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.

Diameter at breast height (d.b.h.).—The outside bark diameter at 4.5 feet (1.37 m) above the forest floor on the uphill side of the tree. For determining breast height, the forest floor includes the duff layer that may be present, but does not include unincorporated woody debris that may rise above the ground line.

Farm.—Any place from which $1,000 or more of agricultural products were produced and sold during the year.

Farmer-owned land.—Land owned by farm operators whether part of the farmstead or not. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. (See Tree, Land, Timberland, Reserved forest land, Other forest land, Stocking, and Water.)

Forest industry land.—Land owned by companies or individuals that operate a primary wood-using plant.

Forest type.—A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types in the State are:

Jack-red-white pine.—Forests in which jack, red, or white pines, singly or in combination, comprise a plurality of the stocking. (These species are generally found in plantations in Indiana.)

Shortleaf pine.—Forests in which shortleaf pine comprises a plurality of the stocking. (Primarily plantations in Indiana.)

Scotch-Virginia pine.—Forests in which Scotch pine, Virginia pine, or eastern redcedar, singly or in combination, comprises a plurality of the stocking. (Common associates include oak, yellow-poplar, red maple, sassafras, and white pine.)

Oak-pine.—Forests in which hardwoods (usually white, scarlet, chestnut, northern red, or black oaks), singly or in combination, comprise a plurality of the stocking but where pines or eastern redcedar comprises 25 to 50 percent of the stocking. (Common associates include gum, hickory, sassafras, and yellow-poplar.)

Oak-hickory.—Forests in which upland oaks or hickories, singly or in combination, comprise a plurality of the stocking, and less than 25 percent of the stocking is in pines or eastern redcedar. (Common associates include yellow-poplar, elm, maple, black walnut, black locust, and sassafras.)

Chestnut-scarlet oak.—Forests in which chestnut oak or scarlet oak, singly or in combination, comprises a plurality of the stocking. (Common associates include eastern redcedar, black oak, white oak, and hickory.)

Sassafras-persimmon.—Forests in which sassafras and persimmon, singly or in combination, comprise at least 50 percent of the stocking. (Common associates include oak, yellow-poplar, elm, maple, and eastern redcedar.)

Oak-gum.—Bottomland forests in which tupelo, blackgum, sweetgum, oaks or cypress, singly or in combination, comprises a plurality of the stocking. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple).

Lowland oak.—Bottomland forests in which wet site oaks such as swamp chestnut, cherry-bark, and pin oak, singly or in combination, comprise a plurality of the stocking. (Common associates include swamp white oak, bur oak, soft maple, and sycamore.)

Elm-ash-soft maple.—Forests in which lowland elm, ash, soft maple, and cottonwood, singly or in combination, comprise a plurality of the stocking. (Common associates include boxelder, willow, sycamore, and beech.)

Cottonwood.—Forests in which cottonwood comprises at least 50 percent of the stocking. (Associates include willow, elm, soft maple, and ash.)

Maple-beech.—Forests in which hard maple or beech, singly or in combination, comprises a plurality of the stocking. (Common associates include soft maple, elm, and basswood.)

Cherry-ash-yellow-poplar.—Forests in which black cherry, white ash, and yellow-poplar, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, maple, black walnut, beech, basswood, and sycamore.)

Growing-stock tree.—A live tree of commercial species that meets specified standards of size, quality, and merchantability. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from 1 foot above the ground to a minimum 4-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

Hard hardwoods.—Hardwood species with an average specific gravity greater than 0.50 such as oaks, hard maple, hickories, and ash.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous. (See Soft hardwoods and Hard hardwoods.)

Idle farmland.—Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.—Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Industrial wood.—All roundwood products, except fuelwood.

Land.—A. *Bureau of the Census.* Dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area. This is the same definition that the Soil Conservation Service uses in the National Resource Inventory. Bureau of the Census estimates of total land area were used in 1967; Soil Conservation Service estimates were used for 1986.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.—Growing-stock, rough, and rotten trees 1.0 inch d.b.h. and larger.

Log grade.—A log classification based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.—The unused growing stock portions of trees cut or killed by logging.

Maintained road.—Any road, hard-topped or other surface, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.—Refers to a pulpwood or saw-log section that meets pulpwood or saw-log specifications, respectively.

Miscellaneous Federal land.—Federal land other than National Forest land.

Miscellaneous private land.—Privately owned land other than forest-industry and farmer-owned land.

Mortality.—The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing stock.—The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. *Nonforest land without trees.*—Nonforest land with no live trees present.

b. *Nonforest land with trees.*—Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.—Timberland less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the timberland classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership size.—A classification of the amount of timberland owned by one owner, regardless of the number of parcels.

Owner tenure.—The length of time a property has been held by the owner.

Pasture.—Land presently used for grazing or under cultivation to develop grazing.

Pastured timberland.—Timberland for which the primary use is wood production, but is presently used for grazing.

Physiographic class.—A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.—Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: cedar barrens.

Xeromesic sites.—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.—Very wet sites where excess water seriously limits both growth and species occurrence. Example: frequently flooded river bottoms and cypress swamps.

Plant byproducts.—Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.—Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stand.—(See Stand-size class.)

Poletimber tree.—A growing-stock tree of commercial species at least 5 inches d.b.h. but smaller than sawtimber size.

Reserved timberland.—Forest land sufficiently productive to qualify as timberland but withdrawn from timber utilization through statute, administrative regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs, and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead tree.—A standing or down dead tree considered merchantable by regional standards.

Sapling.—A live tree 1 to 5 inches d.b.h.

Sapling-seedling stand.—(See Stand-size class.)

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw-log portion.—That part of the bole of sawtimber trees between the stump and the saw-log top.

Saw-log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw-log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stand.—(See Stand-size class.)

Sawtimber tree.—A growing-stock tree of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.—Net volume of the saw-log portion of live sawtimber in board feet, International 1/4-inch rule (unless specified otherwise) from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedling.—A live tree less than 1 inch d.b.h. that is expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Site class.—A classification of forest lands in terms of inherent capacity to grow crops of industrial wood. The class identifies the potential growth in merchantable cubic feet/acre/year at culmination of mean annual increment of fully stocked natural stands.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Soft hardwoods.—Hardwood species with an average specific gravity of 0.50 or less such as gum, yellow-poplar, cottonwood, red maple, basswood, and willow.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.—A group of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.—A classification of stocked (see stocking) forest land based on the size class of live trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

Sawtimber stands.—Stands with half or more of live stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands with half or more live stocking in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands.—Stands with more than half of the live stocking in saplings and/or seedlings.

State land.—Land owned by States or leased to them for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.—Stands in which stocking of trees is 130 percent or more.

Fully stocked stands.—Stands in which stocking of trees is from 100.0 to 129.9 percent.

Medium stocked stands.—Stands in which stocking of trees is from 60.0 to 99.9 percent.

Poorly stocked stands.—Stands in which stocking of trees is from 16.7 to 59.9 percent.

Nonstocked areas.—Commercial forest land on which stocking of trees is less than 16.7 percent.

Timberland.—Forest land that is producing or capable of producing in excess of 20 cubic feet per acre per year of industrial wood crops under natural conditions, that is not withdrawn from timber utilization, and that is not associated with urban or rural development. Currently inaccessible and inoperable areas are included.

Timber removals from growing stock.—The net volume of growing stock in growing-stock trees removed for forest products (including roundwood products and logging residues) and for other uses (see Other removals). Timber removals from growing stock are reported for a single year and are based on information obtained from a survey of primary wood-using mills (see Survey Procedures in Appendix).

Timber removals from sawtimber.—The net board-foot volume of live sawtimber trees removed for forest products (including roundwood products and logging residues) and for other uses (see Other removals). Timber removals from sawtimber are reported for a single year (1988 in this report) and are based on information obtained from a survey of primary wood-using mills (see Survey Procedures in Appendix).

Timber products output.—All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree.—A woody plant usually having one or more perennial stems, a more or less definitely formed crown of foliage, and a height of at least 12 feet at maturity.

Tree biomass.—The total aboveground weight (including the bark) of all trees from 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.—A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; school yards; cemeteries; or other nonforest land not included in any other specified land use class.

Urban forest land.—Forest land closely associated with or in such proximity to urban nonforest land uses that it is not likely to be managed for the production of industrial wood products on a continuing basis. Wood removed would be for land clearing, fuelwood, or aesthetic purposes. Such forest land may be associated with industrial, commercial, residential, or recreational nonforest uses. Residential subdivisions, industrial parks, golf course perimeters, airport buffer strips, and public urban parks that qualify as forest land are included.

Water.—Water Areas. Areas within a land mass persistently covered by water.

(a) *Bureau of the Census.*—Permanent inland water surfaces, such as lakes, reservoirs, and ponds at least 40 acres in area; and streams, sloughs, estuaries, and canals at least one-eighth of a statute mile wide. This is the same definition that the Soil Conservation Service uses in the National Resource Inventory. Bureau of the Census estimates of total water area were used in 1967; Soil Conservation Service estimates were used for 1986.

(b) *Noncensus.*—Permanent inland water surfaces, such as lakes, reservoirs, and ponds from 1 to 39.9 acres in area; and streams, sloughs, estuaries, and canals from 120 feet to one-eighth of a statute mile wide.

Windbreak.—A group of trees whose primary use is to protect buildings currently in use.

Wooded pasture.—Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.—An acre or more of natural continuous forest land that would otherwise meet survey standards for timberland except that it is less than 120 feet wide.

Woodland.—Forest land not capable of producing 20 cubic feet per acre per year of industrial wood crops under natural conditions and not associated with urban or rural development. These sites often contain tree species that are not currently utilized for industrial wood production or trees of poor form, small size, or inferior quality that are unfit for industrial products. Unproductivity may be the result of adverse site conditions such as sterile soil, dry climate, poor drainage, high elevation, and rockiness. This land is not withdrawn from timber utilization.

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[13] *Tables 12-36 are core tables common to all Forest Inventory and Analysis statistical reports in the eastern United States. A larger group of tables reporting the results of the 1986 Indiana forest inventory is in: Smith and Golitz, 1988.*

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Table 12.--Area of land by county and major land use class, Indiana, 1986

Unit and county	Land area	Forest land				Nonforest land with trees	Nonforest land as a percent of land area	Sampling error for timberland
		All forest land	Reserved timberland	Timberland	Timberland as a percent of land area			
	Thousand acres				Percent	Thousand acres	Percent	Percent
Lower Wabash Unit								
Clay	230.5	44.7	0.4	44.3	19.2	15.7	6.8	11.11
Daviess	276.6	42.1	0.5	41.6	15.0	9.9	3.6	11.46
Gibson	313.6	42.4	0.4	42.0	13.4	14.3	4.6	11.41
Greene	348.6	106.2	0.9	105.3	30.2	20.9	6.0	7.20
Knox	332.6	31.0	0.2	30.8	9.3	17.3	5.2	13.32
Martin	216.8	131.9	3.5	128.4	59.2	6.4	3.0	6.52
Parke	284.2	91.0	3.4	87.6	30.8	12.8	4.5	7.90
Pike	218.0	84.4	0.5	83.9	38.5	8.6	3.9	8.07
Posey	261.8	49.9	4.8	45.1	17.2	9.5	3.6	11.01
Putnam	308.4	76.7	0.2	76.5	24.8	16.0	5.2	8.45
Sullivan	287.8	65.5	0.8	64.7	22.5	9.9	3.4	9.19
Vanderburgh	151.1	25.7	1.0	24.7	16.3	18.7	12.4	14.87
Vermillion	166.4	35.0	0.3	34.7	20.9	6.2	3.7	12.55
Vigo	262.1	51.1	0.3	50.8	19.4	15.4	5.9	10.37
Total	3,658.5	877.6	17.2	860.4	23.5	181.6	5.0	2.52
Knobs Unit								
Brown	199.2	150.0	18.4	131.6	66.1	10.4	5.2	3.02
Clark	240.8	85.9	1.0	84.9	35.3	14.2	5.9	3.76
Crawford	196.1	120.8	1.5	119.3	60.8	7.8	4.0	3.17
Dubois	274.8	93.8	0.8	93.0	33.8	15.2	5.5	3.59
Floyd	95.8	34.9	0.4	34.5	36.0	14.2	14.8	5.90
Harrison	311.0	135.2	3.1	132.1	42.5	17.1	5.5	3.01
Jackson	327.8	125.2	4.6	120.6	36.8	17.2	5.2	3.15
Lawrence	289.3	126.8	1.5	125.3	43.3	15.4	5.3	3.09
Monroe	246.4	130.8	13.3	117.5	47.7	13.3	5.4	3.20
Morgan	261.6	88.2	1.5	86.7	33.1	18.3	7.0	3.72
Orange	254.7	131.5	2.4	129.1	50.7	13.3	5.2	3.05
Owen	247.1	110.3	2.8	107.5	43.5	15.7	6.4	3.34
Perry	244.2	153.8	1.3	152.5	62.4	9.7	4.0	2.80
Scott	122.5	45.6	2.6	43.0	35.1	6.9	5.6	5.28
Spencer	256.2	65.0	2.5	62.5	24.4	14.8	5.8	4.38
Warrick	250.4	84.0	2.6	81.4	32.5	16.8	6.7	3.84
Washington	330.2	123.5	3.9	119.6	36.2	23.0	7.0	3.17
Total	4,148.1	1,805.3	64.2	1,741.1	42.0	243.3	5.9	.83
Upland Flats Unit								
Dearborn	196.7	91.1	--	91.1	46.3	12.6	6.4	8.86
Fayette	137.8	33.6	0.1	33.5	24.3	8.5	6.2	14.62
Franklin	246.9	82.2	1.8	80.4	32.6	17.4	7.0	9.43
Jefferson	232.0	87.3	9.0	78.3	33.8	19.7	8.5	9.56
Jennings	241.8	95.7	8.1	87.6	36.2	15.0	6.2	9.04
Ohio	55.8	27.9	--	27.9	50.0	3.6	6.5	16.02
Ripley	286.3	88.8	13.1	75.7	26.4	25.9	9.0	9.72
Switzerland	143.1	75.7	0.5	75.2	52.6	8.9	6.2	9.76
Union	104.0	21.9	0.5	21.4	20.6	6.7	6.4	18.29
Total	1,644.4	604.2	33.1	571.1	34.7	118.3	7.2	3.54

(Table 12 continued on next page)

(Table 12 continued)

Unit and county	Land area	Forest land				Nonforest land with trees	Nonforest land as a percent of land area	Sampling error for timberland
		All forest land	Reserved timberland	Timberland	Timberland as a percent of land area			
	Thousand acres				Percent	Thousand acres	Percent	Percent
Northern Unit								
Adams	217.5	14.2	0.1	14.1	6.5	2.1	1.0	21.78
Allen	421.7	30.5	0.7	29.8	7.1	23.8	5.6	14.98
Bartholomew	261.5	47.1	2.3	44.8	17.1	6.9	2.6	12.22
Benton	260.2	1.5	--	1.5	0.6	0.4	0.2	66.77
Blackford	106.0	9.4	--	9.4	8.9	1.3	1.2	26.67
Boone	271.0	15.3	0.1	15.2	5.6	4.1	1.5	20.97
Carroll	238.1	18.5	0.1	18.4	7.7	6.1	2.6	19.06
Cass	265.1	24.3	0.1	24.2	9.1	5.8	2.2	16.62
Clinton	259.3	9.3	0.1	9.2	3.5	2.4	0.9	26.96
Decatur	238.6	24.3	0.2	24.1	10.1	3.4	1.4	16.66
De Kalb	232.4	27.4	0.1	27.3	11.7	5.9	2.5	15.65
Delaware	250.8	15.9	0.1	15.8	6.3	4.6	1.8	20.57
Elkhart	298.4	29.4	0.3	29.1	9.7	8.4	2.8	15.16
Fountain	254.6	37.4	0.8	36.6	14.4	8.4	3.3	13.52
Fulton	236.3	20.5	0.1	20.4	8.6	5.1	2.2	18.11
Grant	265.5	18.3	0.1	18.2	6.9	4.6	1.7	19.17
Hamilton	255.0	20.4	0.4	20.0	7.8	5.3	2.1	18.29
Hancock	196.5	11.9	0.1	11.8	6.0	4.9	2.5	23.81
Hendricks	261.7	17.8	0.1	17.7	6.8	5.1	1.9	19.44
Henry	251.8	20.7	0.1	20.6	8.2	8.4	3.3	18.02
Howard	187.6	8.7	0.1	8.6	4.6	7.4	3.9	27.88
Huntington	234.4	23.1	0.2	22.9	9.8	5.3	2.3	17.09
Jasper	359.0	27.9	0.9	27.0	7.5	6.6	1.8	15.74
Jay	245.8	24.1	0.1	24.0	9.8	3.0	1.2	16.69
Johnson	205.8	20.2	0.1	20.1	9.8	5.7	2.8	18.24
Kosciusko	345.2	33.1	0.1	33.0	9.6	5.8	1.7	14.24
La Grange	243.2	36.0	0.1	35.9	14.8	10.6	4.4	13.65
Lake	320.5	18.5	0.7	17.8	5.6	11.5	3.6	19.38
La Porte	384.2	42.2	0.8	41.4	10.8	11.2	2.9	12.71
Madison	289.8	13.1	0.1	13.0	4.5	4.4	1.5	22.68
Marion	252.9	1.9	1.0	0.9	0.4	53.3	21.1	86.20
Marshall	284.3	31.1	0.1	31.0	10.9	6.5	2.3	14.69
Miami	240.9	25.5	0.1	25.4	10.5	4.1	1.7	16.23
Montgomery	323.1	25.7	1.7	24.0	7.4	7.2	2.2	16.69
Newton	256.6	19.5	1.6	17.9	7.0	2.1	0.8	19.33
Noble	264.0	33.6	1.3	32.3	12.2	7.9	3.0	14.39
Porter	267.7	37.9	7.3	30.6	11.4	13.6	5.1	14.78
Pulaski	278.1	29.3	2.3	27.0	9.7	5.7	2.0	15.74
Randolph	290.2	19.8	0.1	19.7	6.8	4.2	1.4	18.42
Rush	261.2	12.6	0.2	12.4	4.7	7.4	2.8	23.22
St. Joseph	293.9	23.3	0.8	22.5	7.7	10.3	3.5	17.24
Shelby	264.0	12.6	0.1	12.5	4.7	2.1	0.8	23.13
Starke	198.0	27.1	0.2	26.9	13.6	6.9	3.5	15.77
Steuben	196.8	32.5	1.0	31.5	16.0	7.9	4.0	14.57
Tippecanoe	321.1	22.8	0.2	22.6	7.0	7.8	2.4	17.20
Tipton	166.6	4.8	0.1	4.7	2.8	4.2	2.5	37.72
Wabash	265.6	24.2	0.2	24.0	9.0	8.9	3.4	16.69
Warren	234.5	23.9	0.1	23.8	10.1	5.8	2.5	16.76
Wayne	258.3	32.0	0.1	31.9	12.3	17.1	6.6	14.48
Wells	236.9	17.3	1.1	16.2	6.8	3.4	1.4	20.32
White	324.0	13.1	0.1	13.0	4.0	4.9	1.5	22.68
Whitley	214.9	20.6	0.1	20.5	9.5	5.0	2.3	18.06
Total	13,551.1	1,152.1	28.9	1,123.2	8.3	384.8	2.8	2.44
All counties	23,002.1	4,439.2	143.4	4,295.8	18.7	928.0	4.0	1.00

Table 13.--Area of timberland by county and ownership class, Indiana, 1986

(In thousand acres)

Unit and county	All owners	Ownership class							
		National forest	Misc. federal	State	County & municipal	Forest industry	Farmer	Misc. private-corp.	Misc. private-indiv.
Lower Wabash Unit									
Clay	44.3	--	2.9	--	0.6	--	17.4	6.8	16.6
Daviess	41.6	--	2.6	3.6	0.4	0.2	13.8	6.7	14.3
Gibson	42.0	--	1.9	0.2	0.5	--	17.5	6.4	15.5
Greene	105.3	--	7.1	4.5	0.9	--	37.1	18.4	37.3
Knox	30.8	--	2.0	0.4	0.4	--	13.0	1.9	13.1
Martin	128.4	9.0	12.7	7.6	1.0	1.1	40.5	15.2	41.3
Parke	87.6	--	3.5	0.3	0.9	0.7	33.2	15.3	33.7
Pike	83.9	--	5.0	4.0	0.7	--	28.5	15.7	30.0
Posey	45.1	--	3.1	1.7	0.5	--	17.1	5.9	16.8
Putnam	76.5	--	6.7	2.1	1.0	0.1	29.2	3.7	33.7
Sullivan	64.7	--	4.3	4.9	0.5	--	20.6	11.6	22.8
Vanderburgh	24.7	--	1.3	--	0.3	--	10.2	2.3	10.6
Vermillion	34.7	--	3.1	--	0.2	--	14.1	4.1	13.2
Vigo	50.8	--	3.0	0.2	0.4	--	20.3	8.9	18.0
Total	860.4	9.0	59.2	29.5	8.3	2.1	312.5	122.9	316.9
Knobs Unit									
Brown	131.6	14.4	10.3	23.3	0.3	2.1	29.8	9.3	42.1
Clark	84.9	--	4.1	15.9	0.3	--	23.7	7.7	33.2
Crawford	119.3	19.5	8.3	12.6	0.3	2.4	27.2	8.2	40.8
Dubois	93.0	0.3	6.2	4.5	0.3	0.1	30.8	9.8	41.0
Floyd	34.5	--	--	--	0.1	0.2	14.5	4.3	15.4
Harrison	132.1	--	--	13.9	0.5	1.0	41.4	11.7	63.6
Jackson	120.6	20.0	4.1	6.9	0.5	0.3	32.7	9.2	46.9
Lawrence	125.3	14.9	2.1	--	0.3	0.6	39.3	12.5	55.6
Monroe	117.5	8.0	8.3	18.9	0.3	0.6	30.6	9.2	41.6
Morgan	86.7	--	--	5.2	0.6	1.1	28.5	8.3	43.0
Orange	129.1	26.0	12.4	1.3	0.4	0.7	31.5	8.9	47.9
Owen	107.5	--	6.2	5.5	0.2	0.4	40.8	11.9	42.5
Perry	152.5	53.9	--	3.4	0.3	2.6	32.6	10.3	49.4
Scott	43.0	--	--	5.3	0.3	--	13.4	4.1	19.9
Spencer	62.5	--	--	--	0.4	0.2	22.4	6.7	32.8
Warrick	81.4	--	--	--	0.5	0.5	30.2	8.9	41.3
Washington	119.6	--	--	12.6	0.3	0.7	45.1	13.6	47.3
Total	1,741.1	157.0	62.0	129.3	5.9	13.5	514.5	154.6	704.3
Upland Flats Unit									
Dearborn	91.1	--	2.2	0.3	0.5	--	46.6	5.2	36.3
Fayette	33.5	--	0.8	0.1	0.4	--	16.7	1.3	14.2
Franklin	80.4	--	1.8	0.2	0.6	--	38.6	3.6	35.6
Jefferson	78.3	--	2.0	0.1	0.1	--	36.3	2.8	37.0
Jennings	87.6	--	1.6	6.9	0.6	--	38.1	5.0	35.4
Ohio	27.9	--	0.7	--	0.2	--	14.3	1.5	11.2
Ripley	75.7	--	2.0	--	0.1	--	33.1	2.5	38.0
Switzerland	75.2	--	1.8	--	0.1	--	37.6	3.6	32.1
Union	21.4	--	0.6	--	0.1	--	10.0	1.0	9.7
Total	571.1	--	13.5	7.6	2.7	--	271.3	26.5	249.5

(Table 13 continued on next page)

(Table 13 continued)

Unit and county	All owners	Ownership class							
		National forest	Misc. federal	State	County & municipal	Forest industry	Farmer	Misc. private-corp.	Misc. private-indiv.
Northern Unit									
Adams	14.1	--	0.3	--	0.1	0.1	7.9	1.3	4.4
Allen	29.8	--	0.4	--	0.3	0.2	15.0	3.1	10.8
Bartholomew	44.8	--	1.0	0.1	0.4	0.1	24.8	4.5	13.9
Benton	1.5	--	0.0	--	--	--	0.8	0.2	0.5
Blackford	9.4	--	0.2	--	0.1	--	5.3	0.9	2.9
Boone	15.2	--	0.4	--	0.1	--	8.1	1.6	5.0
Carroll	18.4	--	0.3	0.1	0.2	--	10.0	1.7	6.1
Cass	24.2	--	0.5	--	0.3	0.2	13.6	2.0	7.6
Clinton	9.2	--	0.2	--	0.1	--	5.0	0.9	3.0
Decatur	24.1	--	0.5	--	0.2	--	13.5	2.3	7.6
De Kalb	27.3	--	0.9	--	0.3	0.3	15.3	2.2	8.3
Delaware	15.8	--	0.4	--	0.2	--	8.3	1.6	5.3
Elkhart	29.1	--	0.6	--	0.3	--	16.4	2.4	9.4
Fountain	36.6	--	1.0	--	0.4	--	21.2	2.9	11.1
Fulton	20.4	--	0.5	0.1	0.2	0.3	11.1	1.8	6.4
Grant	18.2	--	0.4	--	0.2	--	10.3	1.6	5.7
Hamilton	20.0	--	0.5	--	0.3	--	11.0	1.7	6.5
Hancock	11.8	--	0.3	--	0.2	--	6.6	0.9	3.8
Hendricks	17.7	--	0.4	--	0.2	--	9.5	1.8	5.8
Henry	20.6	--	0.6	0.3	0.3	0.1	10.6	1.9	6.8
Howard	8.6	--	0.1	--	0.1	--	4.0	1.1	3.3
Huntington	22.9	--	0.5	0.1	0.2	--	13.0	2.0	7.1
Jasper	27.0	--	0.6	1.4	0.3	--	13.5	2.5	8.7
Jay	24.0	--	0.5	--	0.1	--	13.8	2.3	7.3
Johnson	20.1	--	0.4	0.5	0.2	--	10.4	2.0	6.6
Kosciusko	33.0	--	0.6	0.6	0.2	0.4	17.9	3.2	10.1
La Grange	35.9	--	1.9	0.7	0.5	--	18.1	3.5	11.2
Lake	17.8	--	0.5	0.1	0.2	--	9.8	1.6	5.6
La Porte	41.4	--	1.1	1.0	0.4	0.1	21.9	3.8	13.1
Madison	13.0	--	0.2	--	0.1	--	7.4	1.2	4.1
Marion	0.9	--	0.0	--	--	--	0.3	0.1	0.5
Marshall	31.0	--	0.9	0.1	0.2	0.2	17.2	2.8	9.6
Miami	25.4	--	0.5	0.1	0.2	0.2	14.2	2.4	7.8
Montgomery	24.0	--	0.5	--	0.3	--	13.0	2.1	8.1
Newton	17.9	--	0.4	2.0	0.2	--	8.3	1.6	5.4
Noble	32.3	--	0.9	0.3	0.3	0.1	17.2	3.0	10.5
Porter	30.6	--	1.0	0.1	0.5	--	16.1	2.8	10.1
Pulaski	27.0	--	0.6	1.2	0.3	0.1	13.9	2.3	8.6
Randolph	19.7	--	0.4	--	0.1	0.2	10.8	1.8	6.4
Rush	12.4	--	0.2	--	0.2	--	6.1	1.3	4.6
St. Joseph	22.5	--	0.6	--	0.3	--	12.5	1.9	7.2
Shelby	12.5	--	0.3	--	0.1	--	7.0	1.2	3.9
Starke	26.9	--	0.5	1.0	0.3	--	14.2	2.2	8.7
Steuben	31.5	--	0.9	0.9	0.4	0.2	15.8	3.0	10.3
Tippecanoe	22.6	--	0.5	--	0.3	--	12.3	1.9	7.6
Tipton	4.7	--	0.1	--	0.1	--	2.1	0.5	1.9
Wabash	24.0	--	0.8	0.3	0.3	--	12.3	2.3	8.0
Warren	23.8	--	0.5	--	0.2	--	13.2	2.2	7.7
Wayne	31.9	--	1.0	--	0.4	--	17.7	2.8	10.0
Wells	16.2	--	0.4	--	0.2	--	8.9	1.5	5.2
White	13.0	--	0.5	--	0.2	--	6.8	1.2	4.3
Whitley	20.5	--	0.6	--	0.2	--	11.6	1.7	6.4
Total	1,123.2	--	27.9	11.0	12.0	2.8	605.6	103.1	360.8
All counties	4,295.8	166.0	162.6	177.4	28.9	18.4	1,703.9	407.1	1,631.5

Table 14.--Area of timberland by county and forest type, Indiana, 1986

(In thousand acres)

Unit and County	All types	Forest type													
		Jack-red-white pine	Shortleaf pine	Scotch-Virginia pine	Oak-pine	Oak-hickory	Chestnut-scarlet oak	Sassafras-persimmon	Oak-gum	Lowland oak	Elm-ash-soft maple	Cotton-wood	Maple-beech	Cherry-ash-yellow-poplar	Non-stocked
Lower Wabash Unit															
Clay	44.3	1.2	0.2	1.3	0.1	14.1	--	0.1	0.7	0.6	11.3	0.4	7.7	6.5	0.1
Daviess	41.6	0.4	0.3	1.1	0.1	14.5	--	0.4	0.4	0.4	11.1	0.4	7.3	5.0	0.2
Gibson	42.0	0.5	0.2	1.3	0.2	13.9	--	0.4	0.4	0.5	11.2	0.5	7.0	5.7	0.2
Greene	105.3	2.3	0.5	2.8	0.4	33.9	--	1.3	1.6	0.9	28.4	1.4	18.7	12.9	0.2
Knox	30.8	0.1	0.1	0.8	--	10.4	--	0.2	--	0.4	7.9	0.1	5.5	5.1	0.2
Martin	128.4	0.1	0.6	0.6	--	50.1	--	0.9	0.6	1.0	31.4	0.1	27.4	15.5	0.1
Parke	87.6	1.6	0.3	1.9	0.5	30.0	--	0.5	1.2	0.8	23.0	1.3	14.8	11.6	0.1
Pike	83.9	1.2	0.5	1.8	0.4	28.1	--	1.0	1.0	0.7	22.9	1.0	15.1	10.1	0.1
Posey	45.1	0.4	--	0.8	0.1	16.5	--	0.2	0.4	0.5	11.4	0.3	8.3	6.0	0.2
Putnam	76.5	0.1	--	0.8	--	26.6	--	0.2	0.1	1.0	18.8	--	15.6	13.1	0.2
Sullivan	64.7	1.1	0.2	1.4	0.2	22.0	--	1.0	0.9	0.5	17.7	0.6	11.5	7.4	0.2
Vanderburgh	24.7	0.2	0.1	0.6	0.1	8.1	--	0.1	0.1	0.3	6.1	0.1	4.6	4.2	0.1
Vermillion	34.7	0.2	0.1	0.6	--	11.9	--	0.6	0.2	0.2	9.3	0.1	6.9	4.5	0.1
Vigo	50.8	0.5	0.6	1.5	0.2	16.0	--	0.5	0.5	0.5	13.9	0.4	9.0	7.1	0.1
Total	860.4	9.9	3.7	17.3	2.3	296.1	--	7.4	8.1	8.3	224.4	6.7	159.4	114.7	2.1
Knobs Unit															
Brown	131.6	2.0	2.3	3.0	4.3	53.9	4.6	0.5	1.6	0.1	13.7	0.1	30.8	14.4	0.3
Clark	84.9	1.7	1.0	2.9	3.3	30.9	1.9	0.7	1.4	0.2	11.2	0.1	19.1	10.0	0.5
Crawford	119.3	4.4	1.7	1.4	3.1	50.2	2.6	0.4	1.7	0.2	12.8	0.2	26.4	13.7	0.5
Dubois	93.0	1.0	0.3	3.5	3.1	34.6	1.8	0.9	1.2	--	10.7	--	25.3	10.2	0.4
Floyd	34.5	0.2	0.1	0.8	1.2	12.7	0.2	0.1	0.3	--	4.1	--	10.7	3.9	0.2
Harrison	132.1	1.9	0.5	4.9	4.7	50.0	3.4	1.0	2.5	0.4	16.9	0.7	28.3	16.3	0.6
Jackson	120.6	2.1	1.4	2.9	2.9	50.3	4.5	1.4	2.2	0.2	14.5	0.8	21.9	14.9	0.6
Lawrence	125.3	1.3	0.3	2.2	3.0	54.4	3.0	1.0	1.2	--	11.6	0.2	32.5	14.1	0.5
Monroe	117.5	1.0	0.6	2.6	2.8	48.4	2.9	0.9	1.5	--	12.8	0.2	30.2	13.2	0.4
Morgan	86.7	1.3	0.2	2.0	2.7	32.8	2.2	0.6	1.7	0.3	12.2	0.2	18.8	10.9	0.8
Orange	129.1	3.3	2.5	1.8	4.1	54.7	2.8	0.7	2.1	0.3	13.5	0.5	25.6	15.7	1.5
Owen	107.5	0.7	0.1	3.0	4.0	38.6	0.9	0.5	1.6	--	14.2	--	31.4	12.1	0.4
Perry	152.5	4.9	7.8	1.9	4.7	70.5	4.3	0.6	1.5	0.2	12.5	0.2	25.7	16.9	0.8
Scott	43.0	0.6	0.2	1.6	1.3	15.7	1.0	0.4	0.7	--	5.8	0.2	9.7	5.4	0.4
Spencer	62.5	0.8	0.1	2.9	1.8	22.4	1.3	0.9	1.2	--	8.5	0.3	13.8	7.8	0.7
Warrick	81.4	1.2	0.5	3.2	2.6	27.1	1.6	1.0	1.9	0.2	13.2	0.7	16.8	10.8	0.6
Washington	119.6	1.4	0.6	5.1	4.6	42.0	0.7	0.8	1.3	--	14.4	--	35.2	13.0	0.5
Total	1,741.1	29.8	20.2	45.7	54.2	689.2	39.7	12.4	25.6	2.1	202.6	4.4	402.2	203.3	9.7
Upland Flats Unit															
Dearborn	91.1	--	--	0.6	6.6	18.4	--	--	2.5	--	16.5	--	21.3	24.3	0.9
Fayette	33.5	--	--	--	2.1	5.4	--	--	1.6	--	4.7	--	9.3	9.7	0.7
Franklin	80.4	--	--	0.3	6.9	15.1	--	--	2.6	--	9.9	--	20.6	23.9	1.1
Jefferson	78.3	2.4	--	0.1	9.4	16.7	--	--	1.1	--	9.4	--	20.0	18.4	0.8
Jennings	87.6	--	--	0.6	5.8	16.7	--	--	2.9	--	15.6	--	21.7	23.2	1.1
Ohio	27.9	--	--	0.2	2.1	5.6	--	--	0.7	--	4.6	--	6.7	7.7	0.3
Ripley	75.7	1.4	--	0.1	7.8	16.3	--	--	1.1	--	8.8	--	20.0	19.2	1.0
Switzerland	75.2	--	--	--	3.2	18.2	--	--	1.1	--	13.7	--	20.3	18.4	0.3
Union	21.4	--	--	0.1	1.7	3.7	--	--	0.8	--	3.5	--	5.3	6.0	0.3
Total	571.1	3.8	--	2.0	45.6	116.1	--	--	14.4	--	86.7	--	145.2	150.8	6.5

(Table 14 continued on next page)

(Table 14 continued)

Unit and County	All types	Forest type														
		Jack-red-white pine	Shortleaf pine	Scotch-Virginia pine	Oak-pine	Oak-hickory	Chestnut-scarlet oak	Sassafras-persimmon	Oak-gum	Lowland oak	Elm-ash-soft maple	Cotton-wood	Maple-beech	Cherry-ash-yellow-poplar	Non-stocked
Northern Unit															
Adams	14.1	0.1	--	0.1	--	3.5	0.1	--	0.1	0.3	3.8	0.1	3.5	2.2	0.3
Allen	29.8	0.4	--	0.1	0.2	5.7	0.2	--	--	0.4	8.7	0.3	6.7	6.6	0.5
Bartholomew	44.8	0.3	--	0.1	0.1	11.0	0.3	--	0.2	1.0	11.8	0.3	11.9	6.9	0.9
Benton	1.5	--	--	--	--	0.4	--	--	--	--	0.4	--	0.4	0.3	--
Blackford	9.4	--	--	--	--	2.5	--	--	--	0.3	2.2	0.1	2.7	1.4	0.2
Boone	15.2	--	--	--	--	3.6	0.1	--	0.1	0.4	3.7	0.1	4.2	2.5	0.5
Carroll	18.4	0.1	--	0.1	--	4.6	0.1	--	0.1	0.5	4.6	0.1	4.8	3.0	0.4
Cass	24.2	0.4	--	0.2	--	5.9	0.2	--	--	0.3	7.4	0.1	5.5	3.8	0.4
Clinton	9.2	--	--	--	--	2.3	0.1	--	--	0.2	2.1	0.1	2.7	1.5	0.2
Decatur	24.1	0.1	--	--	--	6.2	0.1	--	0.1	0.7	5.7	0.2	6.8	3.7	0.5
De Kalb	27.3	0.4	--	0.2	--	6.7	0.1	--	--	0.3	8.8	0.2	6.1	4.0	0.5
Delaware	15.8	0.2	--	0.1	0.1	3.4	0.1	--	--	0.2	4.6	0.1	3.9	2.9	0.2
Elkhart	29.1	0.3	--	0.1	--	6.9	0.3	--	0.2	0.6	8.3	0.2	6.6	4.6	1.0
Fountain	36.6	0.5	--	0.3	--	9.2	0.2	--	0.1	0.6	11.0	0.2	8.4	5.5	0.6
Fulton	20.4	0.3	--	0.1	--	4.9	0.1	--	--	0.3	6.3	0.1	4.7	3.3	0.3
Grant	18.2	0.1	--	0.1	--	4.8	0.1	--	0.1	0.4	4.4	0.1	4.9	2.8	0.4
Hamilton	20.0	0.2	--	0.1	--	4.9	0.2	--	0.1	0.4	5.7	0.1	4.8	3.0	0.5
Hancock	11.8	0.2	--	0.1	--	3.0	--	--	--	0.1	3.5	0.1	2.8	1.9	0.1
Hendricks	17.7	0.2	--	0.1	--	4.1	0.1	--	0.1	0.3	4.9	0.1	4.5	2.9	0.4
Henry	20.6	0.2	--	0.1	--	5.0	0.1	--	0.1	0.4	5.7	0.1	5.3	3.2	0.4
Howard	8.6	--	--	--	0.1	1.5	--	--	--	0.1	2.3	0.1	2.2	2.1	0.2
Huntington	22.9	0.3	--	0.2	0.1	4.8	0.1	--	--	0.2	7.4	0.2	5.4	3.9	0.3
Jasper	27.0	0.3	--	0.1	0.1	6.2	0.3	--	0.2	0.5	7.7	0.2	6.3	4.4	0.7
Jay	24.0	0.1	--	--	--	6.3	0.1	--	0.1	0.7	5.8	0.1	6.8	3.5	0.5
Johnson	20.1	0.1	--	--	--	5.1	0.1	--	0.1	0.6	4.8	0.1	5.7	3.1	0.4
Kosciusko	33.0	0.2	--	0.1	0.1	8.5	0.2	--	0.1	0.9	8.0	0.2	9.1	5.0	0.6
La Grange	35.9	0.4	--	0.2	--	8.1	0.2	--	0.1	0.4	12.0	0.2	8.6	4.8	0.9
Lake	17.8	0.2	--	0.1	0.1	4.4	0.1	--	0.1	0.3	5.0	0.1	4.5	2.6	0.3
La Porte	41.4	0.4	--	0.1	--	9.8	0.4	--	0.3	0.9	11.9	0.2	9.8	6.1	1.5
Madison	13.0	0.1	--	--	--	3.3	0.1	--	--	0.3	3.3	0.1	3.4	2.2	0.2
Marion	0.9	--	--	--	--	0.3	--	--	--	--	0.1	--	0.3	0.2	--
Marshall	31.0	0.5	--	0.1	--	7.3	0.2	--	0.1	0.5	9.5	0.2	7.1	4.9	0.6
Miami	25.4	0.1	--	0.1	--	6.6	0.1	--	0.1	0.7	6.2	0.2	7.0	3.8	0.5
Montgomery	24.0	0.3	--	0.2	0.1	5.6	0.1	--	--	0.3	6.8	0.2	5.7	4.4	0.3
Newton	17.9	0.1	--	0.1	--	4.7	0.1	--	0.1	0.4	4.7	0.1	4.7	2.7	0.2
Noble	32.3	0.4	--	0.2	0.1	7.3	0.1	--	0.1	0.4	9.8	0.3	7.5	5.6	0.5
Porter	30.6	0.3	--	0.2	--	7.4	0.1	--	0.1	0.5	9.2	0.2	7.6	4.3	0.7
Pulaski	27.0	0.4	--	0.2	--	6.5	0.2	--	0.1	0.5	7.8	0.2	6.2	4.4	0.5
Randolph	19.7	--	--	--	0.1	5.2	0.1	--	0.1	0.6	4.4	0.1	5.7	3.0	0.4
Rush	12.4	0.2	--	0.1	0.1	2.5	--	--	--	0.1	3.4	0.1	3.0	2.8	0.1
St. Joseph	22.5	0.3	--	0.2	0.1	5.3	0.2	--	0.1	0.4	6.7	0.1	5.0	3.4	0.7
Shelby	12.5	--	--	--	--	3.3	--	--	0.1	0.3	3.0	0.1	3.6	1.9	0.2
Starke	26.9	0.3	--	0.1	0.1	6.7	0.2	--	0.1	0.5	7.3	0.2	6.5	4.3	0.6
Steuben	31.5	0.4	--	0.2	0.1	7.1	0.1	--	0.1	0.4	9.6	0.2	7.4	5.4	0.5
Tippecanoe	22.6	0.3	--	0.2	0.1	5.3	0.1	--	--	0.2	6.7	0.2	5.2	4.1	0.2
Tipton	4.7	--	--	0.1	0.1	1.0	--	--	--	0.1	1.2	--	1.2	1.0	--
Wabash	24.0	0.2	--	0.3	0.1	5.7	0.1	--	--	0.3	7.2	0.1	6.0	3.6	0.4
Warren	23.8	0.2	--	0.1	0.1	5.8	0.1	--	0.1	0.5	6.2	0.2	6.1	4.0	0.4
Wayne	31.9	0.4	--	0.2	--	7.7	0.2	--	0.1	0.5	9.8	0.1	7.5	4.8	0.6
Wells	16.2	0.2	--	0.1	0.1	3.8	0.1	--	--	0.2	4.7	0.1	4.0	2.7	0.2
White	13.0	0.2	--	0.1	--	2.8	0.1	--	--	0.1	4.2	0.1	3.0	2.1	0.3
Whitley	20.5	0.3	--	0.1	--	4.9	0.1	--	--	0.4	6.5	0.1	4.6	3.1	0.4
Total	1,123.2	11.2	--	5.6	2.1	269.4	6.4	--	3.6	20.5	316.8	7.3	277.9	180.2	22.2
All counties	4,295.8	54.7	23.9	70.6	104.2	1,370.8	46.1	19.8	51.7	30.9	830.5	18.4	984.7	649.0	40.5

Table 15.--Area of timberland by county and stand-size class, Indiana, 1986

(In thousand acres)

Unit and county	All stands	Stand-size class			
		Sawtimber	Poletimber	Sapling & seedling	Nonstocked
Lower Wabash Unit					
Clay	44.3	30.1	6.0	8.1	0.1
Daviess	41.6	27.2	5.8	8.4	0.2
Gibson	42.0	26.1	6.2	9.5	0.2
Greene	105.3	65.5	17.0	22.6	0.2
Knox	30.8	19.2	3.3	8.1	0.2
Martin	128.4	98.3	12.2	17.8	0.1
Parke	87.6	61.0	12.0	14.5	0.1
Pike	83.9	54.8	13.2	15.8	0.1
Posey	45.1	33.1	4.5	7.3	0.2
Putnam	76.5	56.6	6.2	13.5	0.2
Sullivan	64.7	42.0	9.2	13.3	0.2
Vanderburgh	24.7	16.2	3.0	5.4	0.1
Vermillion	34.7	21.7	4.6	8.3	0.1
Vigo	50.8	30.7	8.8	11.2	0.1
Total	860.4	582.5	112.0	163.8	2.1
Knobs Unit					
Brown	131.6	93.6	18.6	19.0	0.4
Clark	84.9	56.3	11.9	16.3	0.4
Crawford	119.3	76.2	17.6	24.9	0.6
Dubois	93.0	61.6	11.8	19.1	0.5
Floyd	34.5	24.7	3.8	5.9	0.1
Harrison	132.1	84.7	22.3	24.4	0.7
Jackson	120.6	75.3	21.4	23.2	0.7
Lawrence	125.3	89.4	15.7	19.7	0.5
Monroe	117.5	79.6	18.4	19.2	0.3
Morgan	86.7	54.4	12.3	19.3	0.7
Orange	129.1	86.3	19.2	22.0	1.6
Owen	107.5	71.9	13.4	21.8	0.4
Perry	152.5	101.7	22.9	27.0	0.9
Scott	43.0	27.2	6.4	9.1	0.3
Spencer	62.5	38.5	8.9	14.6	0.5
Warrick	81.4	44.9	14.5	21.3	0.7
Washington	119.6	82.4	14.9	21.9	0.4
Total	1,741.1	1,148.7	254.0	328.7	9.7
Upland Flats Unit					
Dearborn	91.1	43.9	20.7	25.6	0.9
Fayette	33.5	12.8	8.2	11.9	0.6
Franklin	80.4	31.7	18.6	29.0	1.1
Jefferson	78.3	45.9	12.9	18.7	0.8
Jennings	87.6	42.2	20.0	24.3	1.1
Ohio	27.9	12.8	6.2	8.6	0.3
Ripley	75.7	41.0	11.9	21.8	1.0
Switzerland	75.2	47.2	10.4	17.3	0.3
Union	21.4	7.9	5.0	8.1	0.4
Total	571.1	285.4	113.9	165.3	6.5

(Table 15 continued on next page)

(Table 15 continued)

Unit and county	All stands	Stand-size class			
		Sawtimber	Poletimber	Sapling & seedling	Nonstocked
Northern Unit					
Adams	14.1	9.8	2.3	1.6	0.4
Allen	29.8	17.6	6.0	5.7	0.5
Bartholomew	44.8	32.3	6.5	5.1	0.9
Benton	1.5	1.1	0.3	0.1	--
Blackford	9.4	7.2	1.2	0.8	0.2
Boone	15.2	10.6	2.1	2.1	0.4
Carroll	18.4	12.7	3.0	2.3	0.4
Cass	24.2	15.8	4.8	3.2	0.4
Clinton	9.2	6.8	1.2	1.0	0.2
Decatur	24.1	18.3	3.0	2.3	0.5
De Kalb	27.3	17.6	5.3	3.9	0.5
Delaware	15.8	10.3	2.9	2.4	0.2
Elkhart	29.1	18.1	5.4	4.6	1.0
Fountain	36.6	24.9	6.8	4.3	0.6
Fulton	20.4	13.7	3.7	2.7	0.3
Grant	18.2	13.6	2.7	1.6	0.3
Hamilton	20.0	12.9	3.7	2.9	0.5
Hancock	11.8	7.8	2.3	1.5	0.2
Hendricks	17.7	11.7	2.9	2.7	0.4
Henry	20.6	13.6	3.6	3.0	0.4
Howard	8.6	5.3	1.5	1.7	0.1
Huntington	22.9	14.3	4.3	4.0	0.3
Jasper	27.0	17.3	4.9	4.1	0.7
Jay	24.0	18.4	3.0	2.1	0.5
Johnson	20.1	14.8	2.7	2.2	0.4
Kosciusko	33.0	25.1	4.3	2.9	0.7
La Grange	35.9	21.5	6.2	7.3	0.9
Lake	17.8	12.2	3.1	2.2	0.3
La Porte	41.4	26.4	7.1	6.5	1.4
Madison	13.0	9.5	2.0	1.3	0.2
Marion	0.9	0.3	0.3	0.3	--
Marshall	31.0	20.3	5.6	4.5	0.6
Miami	25.4	19.4	3.4	2.1	0.5
Montgomery	24.0	15.9	4.7	3.2	0.2
Newton	17.9	13.4	2.9	1.4	0.2
Noble	32.3	20.7	6.1	5.0	0.5
Porter	30.6	19.1	5.7	5.1	0.7
Pulaski	27.0	17.9	5.0	3.6	0.5
Randolph	19.7	15.0	2.5	1.8	0.4
Rush	12.4	7.4	2.5	2.3	0.2
St. Joseph	22.5	13.8	4.3	3.7	0.7
Shelby	12.5	9.5	1.7	1.0	0.3
Starke	26.9	18.2	4.7	3.4	0.6
Steuben	31.5	20.1	5.8	5.1	0.5
Tippecanoe	22.6	14.6	4.6	3.2	0.2
Tipton	4.7	2.8	1.0	0.9	--
Wabash	24.0	15.0	4.6	4.0	0.4
Warren	23.8	16.6	3.9	2.9	0.4
Wayne	31.9	20.6	5.9	4.8	0.6
Wells	16.2	10.9	3.0	2.1	0.2
White	13.0	7.7	2.6	2.4	0.3
Whitley	20.5	13.0	4.0	3.1	0.4
Total	1,123.2	753.4	193.6	154.0	22.2
All counties	4,295.8	2,770.0	673.5	811.8	40.5

Table 16.--Area of timberland by county and site class, Indiana, 1986

(In thousand acres)

Unit and county	All classes	Site class (cubic feet of growth per acre per year)			
		165+	120-164	85-119	50-84	20-49
Lower Wabash Unit						
Clay	44.3	--	8.6	13.4	15.6	6.7
Daviess	41.6	--	6.2	14.1	15.6	5.7
Gibson	42.0	--	6.8	13.7	15.2	6.3
Greene	105.3	--	18.1	36.2	36.1	14.9
Knox	30.8	--	5.1	8.7	11.9	5.1
Martin	128.4	--	17.0	44.8	53.0	13.6
Parke	87.6	--	15.7	29.7	31.2	11.0
Pike	83.9	--	13.6	30.2	29.6	10.5
Posey	45.1	--	7.2	14.7	17.4	5.8
Putnam	76.5	--	14.1	22.3	29.4	10.7
Sullivan	64.7	--	10.0	23.0	23.1	8.6
Vanderburgh	24.7	--	4.8	7.3	9.0	3.6
Vermillion	34.7	--	5.4	11.8	12.7	4.8
Vigo	50.8	--	8.4	17.3	17.8	7.3
Total	860.4	--	141.0	287.2	317.6	114.6
Knobs Unit						
Brown	131.6	--	21.7	43.3	46.2	20.4
Clark	84.9	--	15.4	26.7	29.4	13.4
Crawford	119.3	--	20.7	36.7	39.4	22.5
Dubois	93.0	--	16.2	32.3	31.1	13.4
Floyd	34.5	--	6.4	14.0	10.5	3.6
Harrison	132.1	--	21.3	41.8	45.7	23.3
Jackson	120.6	--	17.2	36.2	44.5	22.7
Lawrence	125.3	--	20.6	41.7	43.1	19.9
Monroe	117.5	--	18.8	40.1	39.7	18.9
Morgan	86.7	--	13.5	26.2	30.9	16.1
Orange	129.1	--	20.2	39.8	44.8	24.3
Owen	107.5	--	18.2	40.8	35.9	12.6
Perry	152.5	--	24.0	47.5	52.4	28.6
Scott	43.0	--	7.2	13.3	15.0	7.5
Spencer	62.5	--	9.8	18.5	23.3	10.9
Warrick	81.4	--	13.1	24.8	28.8	14.7
Washington	119.6	--	22.3	48.2	37.1	12.0
Total	1,741.1	--	286.6	571.9	597.8	284.8
Upland Flats Unit						
Dearborn	91.1	--	15.0	31.1	23.6	21.4
Fayette	33.5	--	5.6	11.9	8.3	7.7
Franklin	80.4	--	12.0	28.8	21.0	18.6
Jefferson	78.3	--	18.2	29.6	18.7	11.8
Jennings	87.6	--	15.1	31.0	21.3	20.2
Ohio	27.9	--	4.5	9.6	7.3	6.5
Ripley	75.7	--	16.5	27.8	19.6	11.8
Switzerland	75.2	--	16.4	27.3	18.5	13.0
Union	21.4	--	3.2	7.0	5.9	5.3
Total	571.1	--	106.5	204.1	144.2	116.3

(Table 16 continued on next page)

(Table 16 continued)

Unit and county	All classes	Site class (cubic feet of growth per acre per year) 165+	120-164	85-119	50-84	20-49
Northern Unit						
Adams	14.1	--	2.1	5.4	4.3	2.3
Allen	29.8	--	3.9	12.5	8.2	5.2
Bartholomew	44.8	--	6.6	17.2	13.9	7.1
Benton	1.5	--	0.3	0.5	0.5	0.2
Blackford	9.4	--	1.5	3.4	3.1	1.4
Boone	15.2	--	2.3	5.6	4.8	2.5
Carroll	18.4	--	2.8	6.9	5.7	3.0
Cass	24.2	--	3.3	9.9	7.0	4.0
Clinton	9.2	--	1.4	3.4	3.0	1.4
Decatur	24.1	--	3.9	8.9	7.6	3.7
De Kalb	27.3	--	3.8	10.6	8.1	4.8
Delaware	15.8	--	2.3	6.2	4.6	2.7
Elkhart	29.1	--	3.8	11.3	8.7	5.3
Fountain	36.6	--	5.3	14.5	10.8	6.0
Fulton	20.4	--	2.9	8.1	6.0	3.4
Grant	18.2	--	3.1	6.8	5.6	2.7
Hamilton	20.0	--	2.9	7.6	6.0	3.5
Hancock	11.8	--	1.8	4.6	3.5	1.9
Hendricks	17.7	--	2.4	6.9	5.4	3.0
Henry	20.6	--	2.9	7.8	6.5	3.4
Howard	8.6	--	1.3	3.4	2.4	1.5
Huntington	22.9	--	3.1	9.3	6.7	3.8
Jasper	27.0	--	3.6	10.7	8.0	4.7
Jay	24.0	--	3.7	8.9	7.7	3.7
Johnson	20.1	--	3.0	7.5	6.5	3.1
Kosciusko	33.0	--	5.2	12.4	10.4	5.0
La Grange	35.9	--	4.2	12.9	11.8	7.0
Lake	17.8	--	2.7	6.8	5.4	2.9
La Porte	41.4	--	5.5	15.6	12.8	7.5
Madison	13.0	--	2.0	5.1	3.9	2.0
Marion	0.9	--	0.1	0.3	0.4	0.1
Marshall	31.0	--	4.0	12.4	9.3	5.3
Miami	25.4	--	4.2	9.5	7.9	3.8
Montgomery	24.0	--	3.8	9.5	6.8	3.9
Newton	17.9	--	3.1	6.8	5.3	2.7
Noble	32.3	--	4.5	12.8	9.4	5.6
Porter	30.6	--	4.2	11.4	9.7	5.3
Pulaski	27.0	--	3.9	10.7	7.8	4.6
Randolph	19.7	--	3.1	7.2	6.4	3.0
Rush	12.4	--	1.7	5.1	3.5	2.1
St. Joseph	22.5	--	3.0	8.7	6.7	4.1
Shelby	12.5	--	2.1	4.6	3.9	1.9
Starke	26.9	--	3.9	10.5	8.1	4.4
Steuben	31.5	--	4.4	12.1	9.4	5.6
Tippecanoe	22.6	--	3.4	9.1	6.4	3.7
Tipton	4.7	--	0.7	1.8	1.4	0.8
Wabash	24.0	--	3.3	9.0	7.6	4.1
Warren	23.8	--	3.6	9.1	7.2	3.9
Wayne	31.9	--	4.1	12.6	9.8	5.4
Wells	16.2	--	2.6	6.3	4.6	2.7
White	13.0	--	1.7	4.9	4.0	2.4
Whitley	20.5	--	2.6	8.2	6.2	3.5
Total	1,123.2	--	161.6	433.3	340.7	187.6
All counties	4,295.8	--	695.7	1,496.5	1,400.3	703.3

Table 17.--Area of timberland by county and stocking class of growing-stock trees, Indiana, 1986

(In thousand acres)

Unit and county	All classes	Stocking class of growing-stock trees (percent)				
		Less than 16.7	16.7-59.9	60.0-99.9	100.0-129.9	130.0+
Lower Wabash Unit						
Clay	44.3	0.1	4.2	23.2	15.2	1.6
Daviess	41.6	0.2	3.3	20.3	15.3	2.5
Gibson	42.0	0.2	3.5	21.5	14.6	2.2
Greene	105.3	0.2	8.2	54.3	37.2	5.4
Knox	30.8	0.2	3.4	16.2	9.5	1.5
Martin	128.4	0.1	9.0	59.1	53.9	6.3
Parke	87.6	0.1	5.3	44.5	34.0	3.7
Pike	83.9	0.1	4.9	42.0	32.8	4.1
Posey	45.1	0.2	3.4	21.9	17.3	2.3
Putnam	76.5	0.2	7.1	39.8	27.4	2.0
Sullivan	64.7	0.2	4.1	32.3	24.6	3.5
Vanderburgh	24.7	0.1	2.0	13.6	8.0	1.0
Vermillion	34.7	0.1	2.6	17.9	12.1	2.0
Vigo	50.8	0.1	3.8	26.3	18.0	2.6
Total	860.4	2.1	64.8	432.9	319.9	40.7
Knobs Unit						
Brown	131.6	0.3	6.1	53.4	61.4	10.4
Clark	84.9	0.4	5.7	33.7	37.7	7.4
Crawford	119.3	0.6	6.0	50.2	52.9	9.6
Dubois	93.0	0.5	6.2	37.9	41.5	6.9
Floyd	34.5	0.2	2.9	13.0	16.0	2.4
Harrison	132.1	0.6	8.4	54.6	60.1	8.4
Jackson	120.6	0.7	7.6	50.5	54.6	7.2
Lawrence	125.3	0.5	5.7	52.6	57.2	9.3
Monroe	117.5	0.4	6.5	49.8	53.2	7.6
Morgan	86.7	0.8	6.3	36.2	38.1	5.3
Orange	129.1	1.6	6.5	52.8	59.2	9.0
Owen	107.5	0.3	9.4	40.6	50.1	7.1
Perry	152.5	0.9	6.0	58.3	72.4	14.9
Scott	43.0	0.3	2.9	17.8	19.0	3.0
Spencer	62.5	0.5	4.6	25.7	27.7	4.0
Warrick	81.4	0.7	7.1	33.4	35.0	5.2
Washington	119.6	0.4	10.8	43.5	55.5	9.4
Total	1,741.1	9.7	108.7	704.0	791.6	127.1
Upland Flats Unit						
Dearborn	91.1	0.9	19.6	42.3	23.4	4.9
Fayette	33.5	0.6	8.7	14.3	8.0	1.9
Franklin	80.4	1.2	19.5	36.4	18.8	4.5
Jefferson	78.3	0.8	13.7	36.9	23.6	3.3
Jennings	87.6	1.1	19.3	38.9	23.3	5.0
Ohio	27.9	0.3	6.2	12.8	7.0	1.6
Ripley	75.7	0.9	14.0	36.7	21.0	3.1
Switzerland	75.2	0.3	11.3	36.1	23.2	4.3
Union	21.4	0.4	5.3	9.7	4.9	1.1
Total	571.1	6.5	117.6	264.1	153.2	29.7

(Table 17 continued on next page)

(Table 17 continued)

Unit and county	All classes	Stocking percent of growing-stock trees				
		Less than 16.7	16.7-59.9	60.0-99.9	100.0-129.9	130.0+
Northern Unit						
Adams	14.1	0.3	2.8	7.0	3.5	0.5
Allen	29.8	0.5	8.3	14.4	5.7	0.9
Bartholomew	44.8	0.9	8.9	21.7	11.8	1.5
Benton	1.5	--	0.3	0.7	0.4	0.1
Blackford	9.4	0.2	1.7	4.5	2.7	0.3
Boone	15.2	0.4	3.2	7.2	4.0	0.4
Carroll	18.4	0.4	3.8	8.9	4.7	0.6
Cass	24.2	0.4	5.1	12.3	5.4	1.0
Clinton	9.2	0.2	1.8	4.3	2.6	0.3
Decatur	24.1	0.5	4.3	11.7	6.8	0.8
De Kalb	27.3	0.5	5.5	14.3	6.0	1.0
Delaware	15.8	0.2	3.5	8.1	3.5	0.5
Elkhart	29.1	1.0	6.4	14.3	6.4	1.0
Fountain	36.6	0.6	7.1	19.0	8.5	1.4
Fulton	20.4	0.4	4.3	10.3	4.6	0.8
Grant	18.2	0.3	3.2	9.2	4.9	0.6
Hamilton	20.0	0.5	4.0	10.2	4.6	0.7
Hancock	11.8	0.1	2.4	6.1	2.7	0.5
Hendricks	17.7	0.4	4.1	8.3	4.3	0.6
Henry	20.6	0.4	4.4	10.0	5.1	0.7
Howard	8.6	0.1	2.4	4.2	1.7	0.2
Huntington	22.9	0.3	4.9	11.8	5.1	0.8
Jasper	27.0	0.7	6.1	13.2	6.1	0.9
Jay	24.0	0.5	4.4	11.5	6.8	0.8
Johnson	20.1	0.5	4.0	9.4	5.6	0.6
Kosciusko	33.0	0.6	6.1	15.9	9.3	1.1
La Grange	35.9	0.9	8.1	17.8	8.0	1.1
Lake	17.8	0.4	3.4	9.0	4.4	0.6
La Porte	41.4	1.4	8.9	20.1	9.7	1.3
Madison	13.0	0.2	2.5	6.4	3.4	0.5
Marion	0.9	--	0.4	0.3	0.2	--
Marshall	31.0	0.6	7.0	15.2	7.0	1.2
Miami	25.4	0.5	4.4	12.5	7.1	0.9
Montgomery	24.0	0.2	4.9	12.8	5.2	0.9
Newton	17.9	0.3	2.8	9.4	4.7	0.7
Noble	32.3	0.5	7.1	16.5	7.0	1.2
Porter	30.6	0.7	6.3	15.4	7.2	1.0
Pulaski	27.0	0.6	5.6	13.7	6.1	1.0
Randolph	19.7	0.4	3.6	9.4	5.7	0.6
Rush	12.4	0.1	3.5	5.9	2.5	0.4
St. Joseph	22.5	0.7	4.9	11.2	4.9	0.8
Shelby	12.5	0.2	2.2	6.1	3.6	0.4
Starke	26.9	0.6	5.5	13.3	6.5	1.0
Steuben	31.5	0.5	6.9	16.2	6.8	1.1
Tippecanoe	22.6	0.2	4.9	11.8	4.8	0.9
Tipton	4.7	--	1.4	2.2	1.0	0.1
Wabash	24.0	0.4	5.2	12.0	5.6	0.8
Warren	23.8	0.4	4.9	11.8	5.9	0.8
Wayne	31.9	0.6	6.9	15.9	7.3	1.2
Wells	16.2	0.2	3.2	8.5	3.7	0.6
White	13.0	0.3	3.0	6.6	2.7	0.4
Whitley	20.5	0.4	4.5	10.3	4.5	0.8
Total	1,123.2	22.2	235.0	558.8	268.3	38.9
All counties	4,295.8	40.5	526.1	1,959.8	1,533.0	236.4

Table 18.--Area of timberland by forest type, ownership class and Forest Survey Unit, Indiana, 1986

(In thousand acres)

Unit and forest type	All owners	Ownership class							
		National Forest	Misc. federal	State	County & municipal	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
All Units									
Jack-red-white pine	54.7	11.5	--	4.5	--	--	6.4	14.0	18.3
Shortleaf pine	23.9	14.8	--	3.5	--	--	1.9	1.6	2.1
Scotch-Virginia pine	70.6	--	--	4.0	--	--	37.0	9.4	20.2
Oak-pine	104.2	3.4	2.5	1.9	--	--	50.4	6.3	39.7
Oak-hickory	1,370.8	99.7	70.0	92.6	8.3	12.5	451.4	111.4	524.9
Chestnut-scarlet oak	46.1	6.2	--	13.9	--	--	1.2	--	24.8
Sassafras-persimmon	19.8	--	--	--	--	--	6.7	2.1	11.0
Oak-gum	51.7	--	--	6.6	--	--	23.0	6.2	15.9
Lowland oak	30.9	--	--	--	--	--	16.2	4.4	10.3
Elm-ash-soft maple	830.5	2.0	28.4	17.8	11.5	--	374.7	103.1	293.0
Cottonwood	18.4	--	--	2.1	2.3	--	2.8	8.8	2.4
Maple-beech	984.7	10.7	42.1	13.1	4.8	3.8	422.1	88.9	399.2
Cherry-ash-yellow-poplar	649.0	16.0	16.9	17.4	2.0	--	295.2	48.5	253.0
Nonstocked	40.5	1.7	2.7	--	--	2.1	14.9	2.4	16.7
All types	4,295.8	166.0	162.6	177.4	28.9	18.4	1,703.9	407.1	1,631.5
Lower Wabash Unit									
Jack-red-white pine	9.9	--	--	--	--	--	--	9.9	--
Shortleaf pine	3.7	0.5	--	1.6	--	--	--	1.6	--
Scotch-Virginia pine	17.3	--	--	--	--	--	8.6	5.4	3.3
Oak-pine	2.3	--	--	--	--	--	--	2.3	--
Oak-hickory	296.1	4.5	40.4	2.0	--	--	101.7	25.5	122.0
Chestnut-scarlet oak	--	--	--	--	--	--	--	--	--
Sassafras-persimmon	7.4	--	--	--	--	--	4.8	--	2.6
Oak-gum	8.1	--	--	4.3	--	--	--	1.5	2.3
Lowland oak	8.3	--	--	--	--	--	2.0	2.0	4.3
Elm-ash-soft maple	224.4	0.8	4.6	11.2	4.0	--	92.2	36.8	74.8
Cottonwood	6.7	--	--	2.1	2.3	--	--	2.3	--
Maple-beech	159.4	2.2	8.6	2.0	--	--	52.8	24.3	69.5
Cherry-ash-yellow-poplar	114.7	1.0	5.6	6.3	2.0	--	50.4	11.3	38.1
Nonstocked	2.1	--	--	--	--	2.1	--	--	--
All types	860.4	9.0	59.2	29.5	8.3	2.1	312.5	122.9	316.9
Knobs Unit									
Jack-red-white pine	29.8	11.5	--	4.5	--	--	3.6	4.1	6.1
Shortleaf pine	20.2	14.3	--	1.9	--	--	1.9	--	2.1
Scotch-Virginia pine	45.7	--	--	4.0	--	--	20.8	4.0	16.9
Oak-pine	54.2	3.4	2.5	1.9	--	--	25.7	1.9	18.8
Oak-hickory	689.2	95.2	20.1	80.6	3.8	9.7	177.9	50.9	251.0
Chestnut-scarlet oak	39.7	6.2	--	13.9	--	--	--	--	19.6
Sassafras-persimmon	12.4	--	--	--	--	--	1.9	2.1	8.4
Oak-gum	25.6	--	--	2.3	--	--	13.1	2.0	8.2
Lowland oak	2.1	--	--	--	--	--	2.1	--	--
Elm-ash-soft maple	202.6	1.2	10.7	4.2	--	--	66.5	31.7	88.3
Cottonwood	4.4	--	--	--	--	--	--	4.4	--
Maple-beech	402.2	8.5	22.6	10.1	2.1	3.8	127.7	38.7	188.7
Cherry-ash-yellow-poplar	203.3	15.0	6.1	5.9	--	--	73.3	14.8	88.2
Nonstocked	9.7	1.7	--	--	--	--	--	--	8.0
All types	1,741.1	157.0	62.0	129.3	5.9	13.5	514.5	154.6	704.3

(Table 18 continued on next page)

(Table 18 continued)

Unit and forest type	All owners	Ownership class							
		National Forest	Misc. federal	State	County & municipal	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Upland Flats Unit									
Jack-red-white pine	3.8	--	--	--	--	--	--	--	3.8
Shortleaf pine	--	--	--	--	--	--	--	--	--
Scotch-Virginia pine	2.0	--	--	--	--	--	2.0	--	--
Oak-pine	45.6	--	--	--	--	--	22.6	2.1	20.9
Oak-hickory	116.1	--	4.7	4.8	--	--	47.7	8.9	50.0
Chestnut-scarlet oak	--	--	--	--	--	--	--	--	--
Sassafras-persimmon	--	--	--	--	--	--	--	--	--
Oak-gum	14.4	--	--	--	--	--	7.5	2.7	4.2
Lowland oak	--	--	--	--	--	--	--	--	--
Elm-ash-soft maple	86.7	--	2.1	--	--	--	45.8	2.1	36.7
Cottonwood	--	--	--	--	--	--	--	--	--
Maple-beech	145.2	--	4.0	--	2.7	--	67.3	4.1	67.1
Cherry-ash-yellow-poplar	150.8	--	--	2.8	--	--	76.7	6.6	64.7
Nonstocked	6.5	--	2.7	--	--	--	1.7	--	2.1
All types	571.1	--	13.5	7.6	2.7	--	271.3	26.5	249.5
Northern Unit									
Jack-red-white pine	11.2	--	--	--	--	--	2.8	--	8.4
Shortleaf pine	--	--	--	--	--	--	--	--	--
Scotch-Virginia pine	5.6	--	--	--	--	--	5.6	--	--
Oak-pine	2.1	--	--	--	--	--	2.1	--	--
Oak-hickory	269.4	--	4.8	5.2	4.5	2.8	124.1	26.1	101.9
Chestnut-scarlet oak	6.4	--	--	--	--	--	1.2	--	5.2
Sassafras-persimmon	--	--	--	--	--	--	--	--	--
Oak-gum	3.6	--	--	--	--	--	2.4	--	1.2
Lowland oak	20.5	--	--	--	--	--	12.1	2.4	6.0
Elm-ash-soft maple	316.8	--	11.0	2.4	7.5	--	170.2	32.5	93.2
Cottonwood	7.3	--	--	--	--	--	2.8	2.1	2.4
Maple-beech	277.9	--	6.9	1.0	--	--	174.3	21.8	73.9
Cherry-ash-yellow-poplar	180.2	--	5.2	2.4	--	--	94.8	15.8	62.0
Nonstocked	22.2	--	--	--	--	--	13.2	2.4	6.6
All types	1,123.2	--	27.9	11.0	12.0	2.8	605.6	103.1	360.8

Table 19.--Area of timberland by ownership class, stocking class of growing-stock trees, and Forest Survey Unit, Indiana, 1986

(In thousand acres)

Unit and ownership class	All classes	Stocking class of growing stock trees (percent) Less than 16.7	16.7-59.9	60.0-99.9	100.0-129.9	130.0+
All Units						
National forest	166.0	1.7	2.0	58.5	82.0	21.8
Miscellaneous federal	162.6	2.7	6.3	66.2	76.9	10.5
State	177.4	--	6.6	60.3	94.6	15.9
County and municipal	28.9	--	11.5	1.7	15.7	--
Forest industry	18.4	2.1	--	6.8	9.5	--
Farmer	1,703.9	14.9	266.3	811.0	526.7	85.0
Misc. private-corporation	407.1	2.4	48.2	176.8	157.1	22.6
Misc. private-individual	1,631.5	16.7	185.2	778.5	570.5	80.6
All owners	4,295.8	40.5	526.1	1,959.8	1,533.0	236.4
Lower Wabash Unit						
National forest	9.0	--	1.0	3.0	5.0	--
Miscellaneous federal	59.2	--	--	17.0	40.2	2.0
State	29.5	--	4.2	15.0	10.3	--
County and municipal	8.3	--	2.0	--	6.3	--
Forest industry	2.1	2.1	--	--	--	--
Farmer	312.5	--	36.7	169.8	88.5	17.5
Misc. private-corporation	122.9	--	4.3	58.4	54.3	5.9
Misc. private-individual	316.9	--	16.6	169.7	115.3	15.3
All owners	860.4	2.1	64.8	432.9	319.9	40.7
Knobs Unit						
National forest	157.0	1.7	1.0	55.5	77.0	21.8
Miscellaneous federal	62.0	--	2.5	33.7	20.1	5.7
State	129.3	--	--	38.4	80.5	10.4
County and municipal	5.9	--	1.7	--	4.2	--
Forest industry	13.5	--	--	4.0	9.5	--
Farmer	514.5	--	48.8	213.0	221.3	31.4
Misc. private-corporation	154.6	--	18.7	62.1	59.8	14.0
Misc. private-individual	704.3	8.0	36.0	297.3	319.2	43.8
All owners	1,741.1	9.7	108.7	704.0	791.6	127.1
Upland Flats Unit						
National forest	--	--	--	--	--	--
Miscellaneous federal	13.5	2.7	2.1	3.8	4.9	--
State	7.6	--	--	2.1	--	5.5
County and municipal	2.7	--	2.7	--	--	--
Forest industry	--	--	--	--	--	--
Farmer	271.3	1.7	56.3	110.9	91.6	10.8
Misc. private-corporation	26.5	--	6.2	10.7	6.9	2.7
Misc. private-individual	249.5	2.1	50.3	136.6	49.8	10.7
All owners	571.1	6.5	117.6	264.1	153.2	29.7
Northern Unit						
National forest	--	--	--	--	--	--
Miscellaneous federal	27.9	--	1.7	11.7	11.7	2.8
State	11.0	--	2.4	4.8	3.8	--
County and municipal	12.0	--	5.1	1.7	5.2	--
Forest industry	2.8	--	--	2.8	--	--
Farmer	605.6	13.2	124.5	317.3	125.3	25.3
Misc. private-corporation	103.1	2.4	19.0	45.6	36.1	--
Misc. private-individual	360.8	6.6	82.3	174.9	86.2	10.8
All owners	1,123.2	22.2	235.0	558.8	268.3	38.9

Table 20.--Area of timberland by forest type, stand-size class, and Forest Survey Unit, Indiana, 1986

(In thousand acres)

Unit and forest type	All stands	Stand-size class			
		Sawtimber	Poletimber	Sapling & seedling	Nonstocked
All Units					
Jack-red-white pine	54.7	22.3	18.3	14.1	--
Shortleaf pine	23.9	7.6	14.5	1.8	--
Scotch-Virginia pine	70.6	24.4	14.1	32.1	--
Oak-pine	104.2	44.6	25.8	33.8	--
Oak-hickory	1,370.8	975.9	189.8	205.1	--
Chestnut-scarlet oak	46.1	46.1	--	--	--
Sassafras-persimmon	19.8	--	4.2	15.6	--
Oak-gum	51.7	29.7	4.6	17.4	--
Lowland oak	30.9	25.3	3.6	2.0	--
Elm-ash-soft maple	830.5	495.4	169.1	166.0	--
Cottonwood	18.4	11.7	6.7	--	--
Maple-beech	984.7	692.3	110.5	181.9	--
Cherry-ash-yellow-poplar	649.0	394.7	112.3	142.0	--
Nonstocked	40.5	--	--	--	40.5
All types	4,295.8	2,770.0	673.5	811.8	40.5
Lower Wabash Unit					
Jack-red-white pine	9.9	7.6	2.3	--	--
Shortleaf pine	3.7	--	3.7	--	--
Scotch-Virginia pine	17.3	7.4	3.1	6.8	--
Oak-pine	2.3	2.3	--	--	--
Oak-hickory	296.1	218.6	27.4	50.1	--
Chestnut-scarlet oak	--	--	--	--	--
Sassafras-persimmon	7.4	--	--	7.4	--
Oak-gum	8.1	5.8	2.3	--	--
Lowland oak	8.3	6.3	--	2.0	--
Elm-ash-soft maple	224.4	132.5	36.1	55.8	--
Cottonwood	6.7	2.3	4.4	--	--
Maple-beech	159.4	113.1	20.5	25.8	--
Cherry-ash-yellow-poplar	114.7	86.6	12.2	15.9	--
Nonstocked	2.1	--	--	--	2.1
All types	860.4	582.5	112.0	163.8	2.1
Knobs Unit					
Jack-red-white pine	29.8	8.1	7.6	14.1	--
Shortleaf pine	20.2	7.6	10.8	1.8	--
Scotch-Virginia pine	45.7	14.2	8.2	23.3	--
Oak-pine	54.2	25.3	13.3	15.6	--
Oak-hickory	689.2	502.5	86.8	99.9	--
Chestnut-scarlet oak	39.7	39.7	--	--	--
Sassafras-persimmon	12.4	--	4.2	8.2	--
Oak-gum	25.6	16.7	2.3	6.6	--
Lowland oak	2.1	2.1	--	--	--
Elm-ash-soft maple	202.6	105.1	48.3	49.2	--
Cottonwood	4.4	2.1	2.3	--	--
Maple-beech	402.2	295.9	38.6	67.7	--
Cherry-ash-yellow-poplar	203.3	129.4	31.6	42.3	--
Nonstocked	9.7	--	--	--	9.7
All types	1,741.1	1,148.7	254.0	328.7	9.7

(Table 20 continued on next page)

(Table 20 continued)

Unit and forest type	All stands	Stand-size class			
		Sawtimber	Poletimber	Sapling & seedling	Nonstocked
Upland Flats Unit					
Jack-red-white pine	3.8	3.8	--	--	--
Shortleaf pine	--	--	--	--	--
Scotch-Virginia pine	2.0	--	--	2.0	--
Oak-pine	45.6	17.0	12.5	16.1	--
Oak-hickory	116.1	70.9	17.4	27.8	--
Chestnut-scarlet oak	--	--	--	--	--
Sassafras-persimmon	--	--	--	--	--
Oak-gum	14.4	4.8	--	9.6	--
Lowland oak	--	--	--	--	--
Elm-ash-soft maple	86.7	44.4	21.8	20.5	--
Cottonwood	--	--	--	--	--
Maple-beech	145.2	83.1	16.9	45.2	--
Cherry-ash-yellow-poplar	150.8	61.4	45.3	44.1	--
Nonstocked	6.5	--	--	--	6.5
All types	571.1	285.4	113.9	165.3	6.5
Northern Unit					
Jack-red-white pine	11.2	2.8	8.4	--	--
Shortleaf pine	--	--	--	--	--
Scotch-Virginia pine	5.6	2.8	2.8	--	--
Oak-pine	2.1	--	--	2.1	--
Oak-hickory	269.4	183.9	58.2	27.3	--
Chestnut-scarlet oak	6.4	6.4	--	--	--
Sassafras-persimmon	--	--	--	--	--
Oak-gum	3.6	2.4	--	1.2	--
Lowland oak	20.5	16.9	3.6	--	--
Elm-ash-soft maple	316.8	213.4	62.9	40.5	--
Cottonwood	7.3	7.3	--	--	--
Maple-beech	277.9	200.2	34.5	43.2	--
Cherry-ash-yellow-poplar	180.2	117.3	23.2	39.7	--
Nonstocked	22.2	--	--	--	22.2
All types	1,123.2	753.4	193.6	154.0	22.2

Table 21.--Number of all live trees on timberland by species group and diameter class, Indiana, 1986

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	1,597	318	285	309	404	184	75	6	10	3	3	--	--	--	--
Red pine	1,421	--	--	546	619	244	12	--	--	--	--	--	--	--	--
White pine	14,561	5,598	4,095	1,185	1,701	1,156	423	313	80	10	--	--	--	--	--
Shortleaf pine	4,370	489	228	931	1,483	907	236	87	9	--	--	--	--	--	--
Other yellow pines	16,293	6,522	3,093	2,787	1,413	1,303	621	434	97	4	9	6	4	--	--
Tamarack	330	72	--	216	--	31	--	11	--	--	--	--	--	--	--
Baldcypress	506	--	45	47	127	143	49	58	21	15	--	--	--	1	--
Eastern redcedar	71,111	48,414	13,206	5,451	2,280	1,064	351	207	107	29	--	--	2	--	--
Other softwoods	3,696	675	1,062	1,260	614	85	--	--	--	--	--	--	--	--	--
Total	113,885	62,088	22,014	12,732	8,641	5,117	1,767	1,116	324	61	12	6	6	1	--
Hardwoods															
Select white oak	61,641	17,616	9,216	5,809	6,617	5,343	4,666	3,801	3,017	2,114	1,400	885	860	257	40
Other white oak	10,996	2,382	1,428	946	1,296	985	1,287	1,087	845	448	180	69	43	--	--
Select red oak	22,850	6,942	2,835	2,221	2,122	1,622	1,420	1,793	1,158	953	683	401	491	187	22
Other red oak	58,408	24,054	7,284	5,496	4,184	3,897	3,579	2,835	2,632	1,739	1,180	598	751	165	14
Select hickory	51,215	19,044	9,609	6,134	5,234	4,332	2,625	1,986	1,201	591	263	107	84	5	--
Other hickory	58,996	23,322	9,801	7,312	6,691	4,334	3,374	1,996	1,083	541	291	125	114	12	--
Basswood	24,442	14,454	4,044	2,024	1,266	934	479	398	295	248	99	82	90	26	3
Beech	41,502	24,861	5,526	2,779	1,701	1,310	1,185	870	680	710	532	416	691	227	14
Hard maple	277,041	181,356	44,628	20,071	11,396	6,921	4,759	3,095	1,968	1,147	696	477	417	105	5
Soft maple	92,445	51,126	16,809	8,298	5,545	3,493	2,671	1,532	1,058	697	412	285	384	102	33
Elm	238,137	159,126	45,603	16,918	8,425	4,240	2,039	945	459	183	88	40	62	9	--
Ash	127,231	68,463	18,843	13,246	9,913	6,340	4,124	2,625	1,634	950	464	256	297	68	8
Sycamore	16,058	3,573	1,941	2,700	1,605	1,814	1,267	967	637	464	409	222	338	112	9
Cottonwood	7,230	1,401	1,263	552	731	676	537	624	383	348	175	115	284	120	21
Willow	13,242	10,023	1,113	740	458	312	181	133	99	53	72	14	29	13	2
Hackberry	32,530	20,157	5,460	2,960	1,409	983	658	349	245	139	76	47	42	2	3
Aspen	6,616	2,601	1,356	830	475	479	341	272	195	48	10	6	2	--	1
Birch	7,362	4,059	1,728	719	336	261	47	105	69	29	4	--	5	--	--
Sweetgum	21,727	12,105	4,059	1,550	1,375	930	759	463	211	123	77	29	28	15	3
Tupelo	30,010	20,358	4,695	1,625	1,222	957	442	324	141	116	53	29	45	3	--
Black cherry	70,926	43,206	13,362	5,129	3,671	2,188	1,673	649	477	301	130	80	42	18	--
Black walnut	25,975	7,737	4,605	3,323	3,655	2,357	1,728	1,060	813	386	178	62	56	12	3
Butternut	531	123	--	102	67	45	90	34	57	5	5	--	3	--	--
Yellow-poplar	59,731	27,516	8,868	5,405	3,832	3,520	2,668	2,501	1,910	1,590	864	494	492	65	6
Persimmon	12,415	5,541	3,333	2,232	840	317	104	38	6	4	--	--	--	--	--
Sassafras	127,639	72,756	30,252	13,561	6,361	2,455	1,168	467	346	164	62	14	31	2	--
Other hardwoods	279,714	211,542	43,584	13,014	5,314	2,685	1,510	979	478	314	120	87	78	6	3
Noncommercial spp.	207,195	164,448	31,416	7,775	2,199	782	255	165	83	43	14	5	4	6	--
Total	1,983,805	1,199,892	332,661	153,471	97,940	64,512	45,636	32,093	22,180	14,448	8,537	4,945	5,763	1,537	190
All species	2,097,690	1,261,980	354,675	166,203	106,581	69,629	47,403	33,209	22,504	14,509	8,549	4,951	5,769	1,538	190

Table 22.--Number of growing-stock trees on timberland by species group and diameter class, Indiana, 1986

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	1,512	318	285	260	404	148	75	6	10	3	3	--	--	--	--
Red pine	1,349	--	--	504	589	244	12	--	--	--	--	--	--	--	--
White pine	14,440	5,541	4,095	1,141	1,690	1,147	423	313	80	10	--	--	--	--	--
Shortleaf pine	4,133	489	228	886	1,426	806	206	83	9	--	--	--	--	--	--
Other yellow pines	15,966	6,522	3,027	2,735	1,356	1,186	606	424	90	4	9	3	4	--	--
Tamarack	330	72	--	216	--	31	--	11	--	--	--	--	--	--	--
Baldcypress	505	--	45	47	127	143	49	58	21	15	--	--	--	--	--
Eastern redcedar	69,318	48,006	13,011	5,243	1,890	717	253	141	45	10	--	--	2	--	--
Other softwoods	3,186	675	810	1,114	519	68	--	--	--	--	--	--	--	--	--
Total	110,739	61,623	21,501	12,146	8,001	4,490	1,624	1,036	255	42	12	3	6	--	--
Hardwoods															
Select white oak	57,924	17,544	8,757	5,227	6,253	4,947	4,142	3,403	2,831	1,941	1,290	759	668	150	12
Other white oak	10,468	2,382	1,428	902	1,196	948	1,154	995	792	406	168	63	34	--	--
Select red oak	21,855	6,942	2,772	2,123	2,086	1,479	1,349	1,644	1,059	881	612	376	398	127	7
Other red oak	55,937	24,054	7,215	5,251	3,768	3,715	3,231	2,577	2,364	1,542	1,003	512	602	98	5
Select hickory	49,415	19,044	9,132	5,967	4,918	4,191	2,460	1,786	1,042	506	222	88	55	4	--
Other hickory	56,897	23,259	9,546	6,976	6,292	4,139	3,052	1,747	949	511	241	102	78	5	--
Basswood	22,448	14,397	3,501	1,429	985	751	376	351	264	189	76	74	49	6	--
Beech	37,349	24,363	5,049	2,537	1,344	973	864	579	496	374	315	210	215	30	--
Hard maple	267,805	180,525	43,542	17,965	10,261	6,079	3,805	2,332	1,525	761	487	303	178	40	2
Soft maple	85,004	50,844	15,369	6,607	4,551	2,892	1,622	1,152	767	488	277	147	221	60	7
Elm	227,516	158,451	42,357	13,803	6,681	3,511	1,374	710	377	128	64	21	33	6	--
Ash	119,514	68,355	17,553	11,575	8,378	5,417	3,210	2,153	1,367	722	371	187	191	34	1
Sycamore	15,043	3,573	1,941	2,587	1,453	1,633	1,123	840	583	434	335	201	255	78	7
Cottonwood	6,591	1,401	1,119	503	635	589	483	535	378	338	145	99	260	91	15
Willow	12,128	10,023	981	513	214	158	47	67	55	11	51	6	2	--	--
Hackberry	30,277	19,749	5,043	2,268	1,200	770	554	285	173	116	63	37	19	--	--
Aspen	6,396	2,601	1,356	773	412	407	331	254	195	48	10	6	2	--	1
Birch	7,228	4,059	1,692	673	336	246	24	105	69	17	4	--	3	--	--
Sweetgum	21,106	12,105	3,855	1,390	1,267	872	737	453	188	103	73	29	18	13	3
Tupelo	29,309	20,358	4,695	1,443	1,080	747	405	263	102	100	53	26	34	3	--
Black cherry	64,177	43,206	11,685	3,461	2,290	1,496	956	435	333	129	116	52	18	--	--
Black walnut	22,691	7,737	4,167	2,740	2,946	1,814	1,365	835	657	252	123	27	25	3	--
Butternut	387	123	--	33	67	45	57	12	40	5	5	--	--	--	--
Yellow-poplar	58,682	27,459	8,733	5,332	3,712	3,429	2,474	2,392	1,880	1,505	835	459	441	31	--
Persimmon	11,493	5,478	3,024	1,895	731	239	94	28	--	4	--	--	--	--	--
Sassafras	116,769	71,604	26,700	10,326	4,832	1,893	757	332	206	90	12	8	9	--	--
Other hardwoods	255,202	208,659	35,196	6,079	2,571	1,344	607	423	171	77	14	34	26	1	--
Total	1,669,611	1,028,295	276,408	120,378	80,459	54,724	36,653	26,688	18,863	11,678	6,965	3,826	3,834	780	60
All species	1,780,350	1,089,918	297,909	132,524	88,460	59,214	38,277	27,724	19,118	11,720	6,977	3,829	3,840	780	60

Table 23.--Net volume of timber on timberland by class of timber and species group, Indiana, 1986

(In thousand cubic feet)

Class of timber	All species	Species group			
		Pine	Other softwoods	Soft hardwoods	Hard hardwoods
Live trees					
Growing-stock trees					
Sawtimber					
Saw log portion	2,941,160	77,953	27,123	914,181	1,921,903
Upper stem portion	823,450	6,666	2,259	264,619	549,906
Total	3,764,610	84,619	29,382	1,178,800	2,471,809
Poletimber	1,453,244	53,684	33,577	519,204	846,779
All growing-stock trees	5,217,854	138,303	62,959	1,698,004	3,318,588
Cull trees					
Short-log trees	162,268	923	885	51,457	109,003
Rough trees					
Sawtimber	305,817	1,865	5,560	101,413	196,979
Poletimber	168,004	1,288	1,546	76,133	89,037
Total	473,821	3,153	7,106	177,546	286,016
Rotten trees					
Sawtimber	154,634	--	--	49,909	104,725
Poletimber	20,711	50	43	10,779	9,839
Total	175,345	50	43	60,688	114,564
All cull trees	811,434	4,126	8,034	289,691	509,583
All live trees	6,029,288	142,429	70,993	1,987,695	3,828,171
Salvable dead trees					
Sawtimber	52,654	1,652	852	11,100	15,739
Poletimber	29,343	1,533	1,299	13,688	36,134
Total	81,997	3,185	2,151	24,788	51,873
All classes	6,111,285	145,614	73,144	2,012,483	3,880,044

Table 24.--Net volume of growing stock in the saw-log portion of sawtimber trees on timberland by species group and diameter class, Indiana, 1986

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	3,141	1,300	1,158	119	285	141	138	--	--	--	--
Red pine	2,046	1,890	156	--	--	--	--	--	--	--	--
White pine	25,805	9,718	5,944	7,062	2,663	418	--	--	--	--	--
Shortleaf pine	14,942	8,685	3,662	2,280	315	--	--	--	--	--	--
Other yellow pines	31,210	9,816	8,743	8,806	2,744	177	437	176	311	--	--
Tamarack	716	407	--	309	--	--	--	--	--	--	--
Baldcypress	7,034	2,128	1,078	1,900	925	1,003	--	--	--	--	--
Eastern redcedar	19,373	7,754	4,784	4,056	1,875	704	--	--	200	--	--
Other softwoods	809	809	--	--	--	--	--	--	--	--	--
Total	105,076	42,507	25,525	24,532	8,807	2,443	575	176	511	--	--
Hardwoods											
Select white oak	437,844	--	52,763	66,449	77,126	72,032	59,150	42,215	49,250	17,156	1,703
Other white oak	81,471	--	13,937	18,672	20,700	14,779	7,528	3,525	2,330	--	--
Select red oak	200,159	--	16,089	30,777	28,052	31,640	27,419	20,222	29,529	15,405	1,026
Other red oak	329,385	--	38,993	47,954	61,966	54,057	44,338	27,405	42,975	10,926	771
Select hickory	143,671	--	32,490	37,876	31,295	20,422	11,250	5,431	4,365	542	--
Other hickory	153,268	--	41,274	36,663	28,810	20,434	12,364	6,605	6,315	803	--
Basswood	38,579	--	4,800	7,002	7,333	7,274	3,601	4,202	3,727	640	--
Beech	92,575	--	11,049	10,980	13,614	13,450	14,082	11,131	15,073	3,196	--
Hard maple	215,607	--	47,310	45,029	41,244	26,853	21,471	16,669	12,373	4,334	324
Soft maple	123,308	--	20,613	22,297	20,234	16,949	12,001	7,763	15,097	7,098	1,256
Elm	50,359	--	16,453	13,069	9,954	4,306	2,716	1,062	2,211	588	--
Ash	179,348	--	37,672	39,615	35,054	24,836	15,769	9,567	12,879	3,814	142
Sycamore	140,002	--	16,754	18,847	19,123	18,508	18,511	13,291	22,609	11,156	1,203
Cottonwood	89,318	--	6,532	11,975	10,148	13,199	7,059	6,340	19,963	11,240	2,862
Willow	6,930	--	625	1,548	1,596	427	2,159	384	191	--	--
Hackberry	26,120	--	6,548	5,110	4,323	4,100	2,708	1,881	1,450	--	--
Aspen	16,932	--	4,175	5,038	5,197	1,597	376	294	157	--	98
Birch	4,829	--	311	1,894	1,690	575	141	--	218	--	--
Sweetgum	33,901	--	9,231	8,349	5,367	3,685	3,154	1,611	1,134	1,175	195
Tupelo	23,744	--	5,010	5,079	3,020	3,689	2,698	1,465	2,526	257	--
Black cherry	48,644	--	12,617	9,242	10,407	5,437	6,098	3,251	1,592	--	--
Black walnut	65,362	--	17,251	15,671	17,066	8,184	4,580	1,174	1,254	182	--
Butternut	2,349	--	752	217	1,051	168	161	--	--	--	--
Yellow-poplar	280,281	--	30,550	45,580	51,285	53,821	37,183	25,416	32,519	3,927	--
Persimmon	1,534	--	977	432	--	125	--	--	--	--	--
Sassafras	24,814	--	8,791	6,065	5,259	3,288	458	414	539	--	--
Other hardwoods	25,750	--	6,741	7,761	4,212	2,815	647	1,721	1,685	168	--
Total	2,836,084	--	460,308	519,191	515,126	426,650	317,622	213,039	281,961	92,607	9,580
All species	2,941,160	42,507	485,833	543,723	523,933	429,093	318,197	213,215	282,472	92,607	9,580

Table 25.--Net volume of growing stock on timberland by species group and diameter class, Indiana, 1986

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	6,119	671	2,029	1,474	1,215	125	302	150	153	--	--	--	--
Red pine	6,763	1,179	3,283	2,138	163	--	--	--	--	--	--	--	--
White pine	39,757	2,788	9,068	10,998	6,237	7,414	2,808	444	--	--	--	--	--
Shortleaf pine	29,314	3,013	9,903	9,827	3,845	2,393	333	--	--	--	--	--	--
Other yellow pines	46,661	6,109	6,867	11,111	9,173	9,242	2,892	188	485	200	394	--	--
Tamarack	1,585	800	--	461	--	324	--	--	--	--	--	--	--
Baldcypress	8,788	196	1,020	2,405	1,132	1,995	975	1,065	--	--	--	--	--
Eastern redcedar	52,586	17,415	14,146	8,775	5,020	4,256	1,974	747	--	--	253	--	--
Other softwoods	9,689	4,461	4,313	915	--	--	--	--	--	--	--	--	--
Total	201,262	36,632	50,629	48,104	26,785	25,749	9,284	2,594	638	200	647	--	--
Hardwoods													
Select white oak	670,710	15,603	39,112	52,484	70,422	84,057	96,341	89,519	75,738	54,889	66,914	23,315	2,316
Other white oak	123,634	2,636	7,180	9,974	18,597	23,625	25,860	18,374	9,638	4,584	3,166	--	--
Select red oak	291,878	6,125	12,410	14,706	21,478	38,938	35,050	39,309	35,120	26,297	40,120	20,931	1,394
Other red oak	497,322	14,106	21,499	37,714	52,041	60,656	77,408	67,185	56,788	35,633	58,395	14,851	1,046
Select hickory	274,705	16,280	28,451	46,103	43,368	47,912	39,087	25,379	14,402	7,060	5,928	735	--
Other hickory	299,253	18,420	36,854	47,038	55,077	46,383	35,992	25,398	15,838	8,587	8,576	1,090	--
Basswood	67,070	3,891	5,684	8,029	6,406	8,862	9,163	9,036	4,609	5,463	5,059	868	--
Beech	145,972	7,570	8,123	10,590	14,749	13,889	17,008	16,713	18,038	14,473	20,479	4,340	--
Hard maple	454,732	51,110	62,034	64,259	63,140	56,969	51,526	33,387	27,492	21,673	16,817	5,885	440
Soft maple	243,760	22,144	30,271	31,954	27,519	28,205	25,272	21,059	15,372	10,094	20,512	9,650	1,708
Elm	174,074	36,697	37,658	34,778	21,962	16,532	12,436	5,350	3,478	1,379	3,003	801	--
Ash	359,677	30,259	45,945	52,912	50,286	50,126	43,780	30,861	20,194	12,442	17,500	5,179	193
Sycamore	219,745	8,040	9,563	20,531	22,364	23,839	23,896	23,003	23,713	17,278	30,728	15,156	1,634
Cottonwood	129,300	1,519	4,332	6,939	8,716	15,152	12,678	16,402	9,040	8,239	27,119	15,273	3,891
Willow	13,501	1,216	1,505	1,939	833	1,959	1,993	531	2,765	500	260	--	--
Hackberry	51,859	5,274	5,949	7,058	8,739	6,462	5,397	5,097	3,468	2,445	1,970	--	--
Aspen	31,290	2,628	2,649	4,377	5,573	6,376	6,490	1,986	481	383	214	--	133
Birch	12,538	1,822	1,957	2,645	415	2,394	2,111	716	181	--	297	--	--
Sweetgum	62,099	3,057	6,904	8,431	12,321	10,560	6,705	4,584	4,041	2,094	1,539	1,597	266
Tupelo	46,152	3,369	5,104	7,078	6,683	6,421	3,770	4,584	3,458	1,907	3,429	349	--
Black cherry	102,003	8,745	14,257	16,522	16,841	11,693	12,995	6,753	7,809	4,227	2,161	--	--
Black walnut	127,229	7,426	17,143	18,964	23,023	19,838	21,317	10,171	5,868	1,528	1,704	247	--
Butternut	3,981	128	418	430	1,004	275	1,311	209	206	--	--	--	--
Yellow-poplar	432,602	14,641	22,137	36,250	40,772	57,667	64,059	66,877	47,625	33,050	44,187	5,337	--
Persimmon	12,010	4,335	3,406	2,265	1,303	546	--	155	--	--	--	--	--
Sassafras	97,800	23,675	24,298	17,912	11,734	7,668	6,569	4,086	587	539	732	--	--
Other hardwoods	71,696	12,720	13,076	12,746	8,999	9,816	5,260	3,498	827	2,239	2,287	228	--
Total	5,016,592	323,436	467,919	574,628	614,365	656,820	643,474	530,222	406,776	277,003	383,096	125,832	13,021
All species	5,217,854	360,068	518,548	622,732	641,150	682,569	652,758	532,816	407,414	277,203	383,743	125,832	13,021

Table 26.--Net volume of sawtimber on timberland by species group and diameter class, Indiana, 1986

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	18,409	7,601	6,644	704	1,722	871	867	--	--	--	--
Red pine	11,919	11,026	893	--	--	--	--	--	--	--	--
White pine	151,387	56,747	34,104	41,894	16,063	2,579	--	--	--	--	--
Shortleaf pine	87,129	50,686	21,019	13,521	1,903	--	--	--	--	--	--
Other yellow pines	183,341	57,316	50,162	52,227	16,548	1,093	2,745	1,136	2,114	--	--
Tamarack	4,208	2,377	--	1,831	--	--	--	--	--	--	--
Baldcypress	41,635	12,411	6,189	11,265	5,583	6,187	--	--	--	--	--
Eastern redcedar	113,761	45,260	27,450	24,056	11,299	4,338	--	--	1,358	--	--
Other softwoods	4,724	4,724	--	--	--	--	--	--	--	--	--
Total	616,513	248,148	146,461	145,498	53,118	15,068	3,612	1,136	3,472	--	--
Hardwoods											
Select white oak	2,875,793	--	345,526	431,290	503,212	471,879	392,096	280,441	326,321	113,721	11,307
Other white oak	533,134	--	91,276	121,194	135,086	96,825	49,896	23,411	15,446	--	--
Select red oak	1,316,182	--	105,383	199,781	183,072	207,238	181,782	134,347	195,693	102,084	6,802
Other red oak	2,163,418	--	255,361	311,246	404,356	354,139	293,960	182,026	284,801	72,428	5,101
Select hickory	939,742	--	212,812	245,835	204,186	133,774	74,561	36,069	28,921	3,584	--
Other hickory	1,003,171	--	270,299	237,979	188,012	133,856	81,982	43,886	41,839	5,318	--
Basswood	253,100	--	31,440	45,458	47,859	47,651	23,859	27,913	24,682	4,238	--
Beech	608,945	--	72,371	71,277	88,837	88,099	93,368	73,937	99,882	21,174	--
Hard maple	1,413,239	--	309,851	292,294	269,157	175,957	142,346	110,740	82,036	28,712	2,146
Soft maple	809,358	--	135,029	144,729	131,988	111,029	79,574	51,572	100,057	47,052	8,328
Elm	329,362	--	107,749	84,859	64,946	28,209	18,005	7,046	14,646	3,902	--
Ash	1,174,946	--	246,716	257,205	228,685	162,697	104,521	63,570	85,345	25,265	942
Sycamore	920,914	--	109,723	122,326	124,834	121,252	122,751	88,291	149,847	73,922	7,968
Cottonwood	587,853	--	42,773	77,740	66,225	86,468	46,785	42,106	132,293	74,494	18,969
Willow	45,497	--	4,094	10,054	10,413	2,799	14,315	2,554	1,268	--	--
Hackberry	171,147	--	42,887	33,155	28,197	26,854	17,951	12,491	9,612	--	--
Aspen	110,582	--	27,347	32,716	33,918	10,466	2,490	1,954	1,042	--	649
Birch	31,507	--	2,036	12,295	11,023	3,772	934	--	1,447	--	--
Sweetgum	222,029	--	60,449	54,195	35,025	24,150	20,914	10,698	7,511	7,789	1,298
Tupelo	155,667	--	32,794	32,956	19,691	24,164	17,891	9,740	16,730	1,701	--
Black cherry	318,703	--	82,643	59,997	67,897	35,603	40,414	21,601	10,548	--	--
Black walnut	427,405	--	112,991	101,758	111,354	53,616	30,367	7,807	8,311	1,201	--
Butternut	15,368	--	4,929	1,412	6,857	1,101	1,069	--	--	--	--
Yellow-poplar	1,840,013	--	200,080	295,847	334,647	352,563	246,507	168,830	215,507	26,032	--
Persimmon	10,011	--	6,390	2,802	--	819	--	--	--	--	--
Sassafras	162,154	--	57,581	39,361	34,314	21,537	3,039	2,754	3,568	--	--
Other hardwoods	168,454	--	44,159	50,372	27,487	18,443	4,283	11,436	11,162	1,112	--
Total	18,607,694	--	3,014,689	3,370,133	3,361,278	2,794,960	2,105,660	1,415,220	1,868,515	613,729	63,510
All species	19,224,207	248,148	3,161,150	3,515,631	3,414,396	2,810,028	2,109,272	1,416,356	1,871,987	613,729	63,510

[1/] International 1/4-inch rule.

Table 27.--Net volume of live trees and growing stock on timberland by ownership class and species group, Indiana, 1986

(In thousand cubic feet)

Ownership class	Live trees					Growing stock				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
National forest	254,132	19,403	4,168	45,251	185,310	238,825	18,852	3,418	41,894	174,661
Miscellaneous federal	233,839	234	479	73,378	159,748	209,504	234	479	62,744	146,047
State	305,340	13,509	3,223	66,377	222,231	282,535	13,211	3,002	60,852	205,470
County and municipal	43,215	--	176	21,336	21,703	36,332	--	176	18,661	17,495
Forest industry	29,702	--	--	4,639	25,063	26,484	--	--	3,836	22,648
Farmer	2,385,968	38,538	29,107	884,352	1,433,971	2,006,762	37,841	24,587	737,712	1,206,622
Misc. private-corp.	522,104	25,906	4,535	173,911	317,752	449,452	25,076	4,399	147,238	272,739
Misc. private-indiv.	2,254,988	44,839	29,305	718,451	1,462,393	1,967,960	43,089	26,898	625,067	1,272,906
All owners	6,029,288	142,429	70,993	1,987,695	3,828,171	5,217,854	138,303	62,959	1,698,004	3,318,588

Table 28.--Net volume of growing stock and sawtimber on timberland by county and species group, Indiana, 1986

Unit and county	Growing stock					Sawtimber				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Thousand cubic feet					Thousand board feet[1/]				
Lower Wabash Unit										
Clay	54,350	2,139	683	19,875	31,653	201,560	7,336	3,187	72,457	118,580
Daviess	51,379	834	480	19,272	30,793	190,478	2,793	2,216	67,843	117,626
Gibson	49,000	1,129	663	19,476	27,732	176,850	3,862	3,089	67,290	102,609
Greene	124,809	4,199	1,638	46,837	72,135	452,848	14,001	7,761	159,881	271,205
Knox	34,410	224	119	12,608	21,459	125,878	712	437	45,522	79,207
Martin	182,406	768	173	58,748	122,717	707,052	1,713	456	220,816	484,067
Parke	113,973	3,278	2,044	46,542	62,109	413,849	11,729	9,692	164,619	227,809
Pike	106,030	2,499	1,529	41,793	60,209	384,936	8,848	7,229	145,734	223,125
Posey	60,703	765	482	22,213	37,243	229,581	2,704	2,188	81,677	143,012
Putnam	98,882	383	141	34,410	63,948	374,028	1,120	352	133,362	239,194
Sullivan	81,544	2,056	1,062	31,031	47,395	298,467	7,278	5,016	107,987	178,186
Vanderburgh	29,304	434	237	11,067	17,566	106,337	1,470	1,073	39,582	64,212
Vermillion	41,650	477	169	14,517	26,487	153,001	1,608	747	50,764	99,882
Vigo	58,801	1,197	686	22,997	33,921	211,903	4,074	3,181	79,378	125,270
Total	1,087,241	20,382	10,106	401,386	655,367	4,026,768	69,248	46,624	1,436,912	2,473,984
Knobs Unit										
Brown	190,259	8,195	2,461	48,910	130,693	714,793	29,540	6,691	174,604	503,958
Clark	112,526	7,291	1,740	31,268	72,227	420,750	27,797	4,946	110,599	277,408
Crawford	157,423	4,623	2,146	42,229	108,425	582,098	15,055	5,262	148,508	413,273
Dubois	124,001	4,060	1,594	34,760	83,587	470,282	16,686	3,692	125,336	324,568
Floyd	47,433	1,374	543	14,521	30,995	180,034	5,916	1,206	54,808	118,104
Harrison	175,761	6,689	3,656	51,713	113,703	641,916	24,888	8,139	178,209	430,680
Jackson	159,454	5,021	2,711	44,822	106,900	575,103	13,959	6,485	151,358	403,301
Lawrence	180,706	3,411	1,620	45,880	129,795	687,495	12,534	4,411	166,445	504,105
Monroe	165,021	3,820	1,713	45,161	114,327	618,137	12,813	4,049	160,031	441,244
Morgan	109,257	3,048	1,986	32,002	72,221	401,468	10,326	4,788	113,332	273,022
Orange	176,616	6,318	3,205	47,124	119,969	648,722	19,654	8,536	164,657	455,875
Owen	140,177	4,755	2,055	43,397	89,970	528,332	20,687	4,748	162,214	340,683
Perry	213,369	12,765	3,221	51,015	146,368	778,940	38,823	9,271	175,047	555,799
Scott	55,632	2,236	924	15,822	36,650	205,427	8,010	2,247	54,767	140,403
Spencer	78,458	2,959	1,315	22,610	51,574	291,161	11,500	3,100	78,946	197,615
Warrick	95,835	4,284	2,011	30,517	59,023	340,965	13,605	4,750	102,429	220,181
Washington	159,816	7,721	2,246	49,255	100,594	603,222	33,974	4,898	183,363	380,987
Total	2,341,744	88,570	35,147	651,006	1,567,021	8,688,845	315,767	87,219	2,304,653	5,981,206
Upland Flats Unit										
Dearborn	86,497	154	2,306	30,892	53,145	300,737	495	3,042	112,604	184,596
Fayette	25,332	92	442	9,049	15,749	81,280	426	775	31,055	49,024
Franklin	61,558	278	1,616	20,519	39,145	199,848	1,063	2,961	69,953	125,871
Jefferson	85,451	4,381	3,844	27,589	49,637	305,240	15,438	4,592	103,230	181,980
Jennings	82,835	170	2,082	29,975	50,608	288,264	674	3,101	110,005	174,484
Ohio	25,277	49	679	8,894	15,655	86,903	174	912	32,085	53,732
Ripley	76,125	2,648	2,759	24,366	46,352	271,884	9,438	3,628	90,054	168,764
Switzerland	90,286	151	1,364	31,045	57,726	341,015	602	1,059	121,672	217,682
Union	15,853	55	420	5,641	9,737	51,370	214	740	19,137	31,279
Total	549,214	7,978	15,512	187,970	337,754	1,926,541	28,524	20,810	689,795	1,187,412

(Table 28 continued on next page)

[1/] International 1/4-inch rule.

(Table 28 continued)

Unit and county	Growing stock					Sawtimber				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Thousand cubic feet					Thousand board feet[1/]				
Northern Unit										
Adams	16,408	220	38	5,997	10,153	61,593	451	91	21,026	40,025
Allen	26,954	591	32	10,026	16,305	96,699	1,296	22	32,849	62,532
Bartholomew	53,422	428	111	18,788	34,095	203,754	879	267	66,389	136,219
Benton	1,938	30	3	708	1,197	7,241	59	8	2,463	4,711
Blackford	12,009	50	29	4,127	7,803	46,569	97	74	14,906	31,492
Boone	17,396	70	46	5,937	11,343	66,503	142	108	20,781	45,472
Carroll	21,031	237	49	7,455	13,290	79,198	480	120	25,982	52,616
Cass	26,154	662	33	10,177	15,282	94,732	1,350	70	34,654	58,658
Clinton	11,342	34	27	3,690	7,591	44,083	75	66	13,207	30,735
Decatur	30,582	164	72	10,322	20,024	118,120	330	178	36,884	80,728
De Kalb	29,326	830	32	11,661	16,803	105,108	1,676	67	39,410	63,955
Delaware	16,516	368	20	6,219	9,909	59,820	755	30	20,762	38,273
Elkhart	30,309	570	81	11,437	18,221	110,484	1,146	203	38,812	70,323
Fountain	41,490	1,026	53	16,130	24,281	151,318	2,088	123	55,548	93,559
Fulton	22,328	478	31	8,532	13,287	81,940	994	65	29,399	51,482
Grant	22,802	296	47	8,119	14,340	86,318	591	116	28,643	56,968
Hamilton	21,539	481	48	8,176	12,834	77,697	937	115	27,288	49,357
Hancock	12,774	373	14	5,007	7,380	45,787	751	27	16,873	28,136
Hendricks	19,187	174	37	6,815	12,161	72,388	368	86	23,696	48,238
Henry	22,631	365	37	8,255	13,974	83,665	725	84	28,106	54,750
Howard	8,030	104	12	2,786	5,128	29,480	246	7	9,131	20,096
Huntington	23,195	621	21	8,827	13,726	83,370	1,285	25	29,101	52,959
Jasper	28,446	459	65	10,555	17,367	104,622	934	155	35,934	67,599
Jay	30,777	109	73	10,530	20,065	119,725	234	190	38,230	81,071
Johnson	24,206	101	55	8,241	15,809	93,398	203	138	29,390	63,667
Kosciusko	41,899	212	96	14,490	27,101	162,276	454	244	52,413	109,165
La Grange	34,854	728	45	13,430	20,651	124,862	1,410	100	44,087	79,265
Lake	20,362	378	36	7,578	12,370	74,951	742	83	25,851	48,275
La Porte	44,163	619	119	16,257	27,168	162,766	1,199	300	55,203	106,064
Madison	15,891	177	31	5,601	10,082	60,440	371	71	19,838	40,160
Marion	466	--	--	89	377	1,675	--	--	190	1,485
Marshall	32,896	608	48	12,497	19,743	121,437	1,281	107	43,267	76,782
Miami	32,495	278	70	11,441	20,706	124,540	557	178	40,900	82,905
Montgomery	25,962	780	26	10,087	15,069	92,788	1,598	30	33,747	57,413
Newton	22,640	436	39	8,429	13,736	84,216	865	90	29,384	53,877
Noble	33,525	823	38	12,876	19,788	120,885	1,691	60	43,149	75,985
Porter	31,638	733	52	11,989	18,864	112,945	1,382	121	39,047	72,395
Pulaski	29,497	655	50	11,265	17,527	107,732	1,346	113	38,583	67,690
Randolph	25,180	105	61	8,287	16,727	97,813	218	156	29,782	67,657
Rush	11,146	239	10	4,059	6,838	40,171	524	1	13,299	26,347
St. Joseph	22,949	509	53	8,822	13,565	82,525	1,010	130	29,470	51,915
Shelby	15,851	146	35	5,594	10,076	60,697	293	86	20,014	40,304
Starke	30,066	524	62	11,120	18,360	111,362	1,062	151	38,421	71,728
Steuben	32,116	803	38	12,370	18,905	115,318	1,636	60	41,185	72,437
Tippecanoe	23,654	730	21	9,280	13,623	84,092	1,497	23	30,902	51,670
Tipton	4,204	86	4	1,487	2,627	15,186	185	2	4,831	10,168
Wabash	24,763	570	34	9,339	14,820	88,725	1,097	69	30,550	57,009
Warren	27,035	385	52	9,798	16,800	101,332	798	120	34,187	66,227
Wayne	33,800	698	46	12,833	20,223	123,515	1,412	103	43,664	78,336
Wells	17,862	453	22	6,848	10,539	64,464	915	37	22,972	40,540
White	12,425	338	14	4,884	7,189	43,779	675	25	15,879	27,200
Whitley	21,524	519	26	8,375	12,604	77,949	1,060	56	28,446	48,387
Total	1,239,655	21,373	2,194	457,642	758,446	4,582,053	43,370	4,951	1,568,725	2,965,007
All counties	5,217,854	138,303	62,959	1,698,004	3,318,588	19,224,207	456,909	159,604	6,000,085	12,607,609

[1/] International 1/4-inch rule.

Table 29.--Net volume of sawtimber on timberland by species group and butt log grade. Indiana, 1986

(In thousand board feet)[1/]

Species group	All species	Butt log grade 1	2	3	Tie and timber
Softwoods					
Jack pine	18,409	--	--	18,409	--
Red pine	11,919	--	--	11,919	--
White pine	151,387	6,862	1,475	126,306	16,744
Shortleaf pine	87,129	--	7,837	79,292	--
Other yellow pines	183,341	--	6,658	175,749	934
Tamarack	4,208	--	--	4,208	--
Baldcypress	41,635	--	2,098	39,537	--
Eastern redcedar	113,761	--	2,177	110,712	872
Other softwoods	4,724	--	--	4,724	--
Total	616,513	6,862	20,245	570,856	18,550
Hardwoods					
Select white oak	2,875,793	457,221	781,401	1,016,708	620,463
Other white oak	533,134	15,331	99,798	229,002	189,003
Select red oak	1,316,182	89,266	187,078	387,335	652,503
Other red oak	2,163,418	110,707	260,533	569,454	1,222,724
Select hickory	939,742	31,885	99,488	310,018	498,351
Other hickory	1,003,171	46,503	145,824	375,600	435,244
Basswood	253,100	35,682	71,475	114,921	31,022
Beech	608,945	--	4,637	48,263	556,045
Hard maple	1,413,239	39,780	134,478	488,919	750,062
Soft maple	809,358	5,742	68,788	203,212	531,616
Elm	329,362	20,241	70,656	156,033	82,432
Ash	1,174,946	155,788	336,442	491,615	191,101
Sycamore	920,914	203,738	256,111	320,924	140,141
Cottonwood	587,853	74,377	164,863	181,615	166,998
Willow	45,497	2,635	3,946	11,781	27,135
Hackberry	171,147	11,996	53,025	74,387	31,739
Aspen	110,582	--	5,409	20,879	84,294
Birch	31,507	2,827	3,504	6,849	18,327
Sweetgum	222,029	14,347	48,417	79,708	79,557
Tupelo	155,667	11,453	31,317	42,258	70,639
Black cherry	318,703	17,220	60,998	122,139	118,346
Black walnut	427,405	46,038	126,987	214,268	40,112
Butternut	15,368	--	3,658	9,197	2,513
Yellow-poplar	1,840,013	191,596	216,972	391,441	1,040,004
Persimmon	10,011	--	1,909	8,102	--
Sassafras	162,154	5,558	30,387	90,469	35,740
Other hardwoods	168,454	1,083	16,323	54,608	96,440
Total	18,607,694	1,591,014	3,284,424	6,019,705	7,712,551
All species	19,224,207	1,597,876	3,304,669	6,590,561	7,731,101

[1/] International 1/4-inch rule.

Table 30.--Net annual growth of growing stock and sawtimber on timberland by county and species group, Indiana, 1985

Unit and county	Growing stock					Sawtimber				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Thousand cubic feet					Thousand board feet[1/]				
Lower Wabash Unit										
Clay	1,635	105	20	696	814	8,293	464	83	2,808	4,938
Daviess	1,522	40	9	714	759	7,045	227	20	2,716	4,082
Gibson	1,536	53	10	746	727	6,931	307	27	2,756	3,841
Greene	3,875	193	33	1,768	1,881	17,306	986	140	6,394	9,786
Knox	1,043	12	8	446	577	5,265	46	5	1,834	3,380
Martin	4,673	19	6	1,911	2,737	23,816	61	8	8,168	15,579
Parke	3,544	145	20	1,753	1,626	16,252	926	81	6,626	8,619
Pike	3,278	110	15	1,598	1,555	14,694	694	60	5,969	7,971
Posey	1,728	36	9	772	911	8,591	211	19	3,169	5,192
Putnam	2,811	30	9	1,098	1,674	16,013	61	10	5,024	10,918
Sullivan	2,473	93	17	1,157	1,206	11,208	528	62	4,384	6,234
Vanderburgh	917	20	4	409	484	4,367	106	11	1,550	2,700
Vermillion	1,247	22	6	529	690	5,783	102	17	2,023	3,641
Vigo	1,860	54	10	903	893	8,237	309	28	3,301	4,599
Total	32,142	932	176	14,500	16,534	153,801	5,028	571	56,722	91,480
Knobs Unit										
Brown	5,261	212	89	1,893	3,067	27,360	1,640	538	9,031	16,151
Clark	3,452	245	68	1,292	1,847	17,252	933	349	6,795	9,175
Crawford	4,600	77	78	1,767	2,678	22,989	1,442	412	7,487	13,648
Dubois	3,727	186	69	1,369	2,103	19,040	740	401	6,514	11,385
Floyd	1,394	56	17	505	816	7,961	254	126	2,364	5,217
Harrison	5,593	275	150	2,232	2,936	25,693	1,294	442	9,949	14,008
Jackson	4,692	128	138	1,932	2,494	21,718	1,381	322	7,452	12,563
Lawrence	4,999	113	56	1,776	3,054	26,324	1,269	502	7,973	16,580
Monroe	4,811	143	85	1,830	2,753	23,521	661	475	7,720	14,665
Morgan	3,499	130	73	1,396	1,900	16,010	491	275	6,196	9,048
Orange	4,946	81	103	1,904	2,858	25,061	2,060	372	7,995	14,634
Owen	4,219	180	95	1,537	2,407	22,905	822	476	6,963	14,644
Perry	5,441	66	76	1,970	3,329	29,490	2,681	409	8,394	18,006
Scott	1,763	101	42	689	931	8,198	376	157	3,165	4,500
Spencer	2,477	136	67	963	1,311	11,357	545	232	4,254	6,326
Warrick	3,279	196	118	1,397	1,568	14,014	624	257	5,875	7,258
Washington	4,793	287	77	1,729	2,700	27,229	1,381	446	8,178	17,224
Total	68,946	2,612	1,401	26,181	38,752	346,122	18,594	6,191	116,305	205,032
Upland Flats Unit										
Dearborn	2,699	5	121	1,100	1,473	9,668	11	31	4,327	5,299
Fayette	897	1	19	387	490	2,997	8	-12	1,323	1,678
Franklin	2,175	7	97	856	1,215	7,406	19	18	3,077	4,292
Jefferson	2,402	97	114	899	1,292	9,598	271	58	3,991	5,278
Jennings	2,615	4	102	1,092	1,417	9,405	13	23	4,273	5,096
Ohio	808	1	38	329	440	2,843	3	8	1,250	1,582
Ripley	2,202	58	99	808	1,237	8,791	164	59	3,552	5,016
Switzerland	2,414	5	64	925	1,420	9,774	8	22	4,181	5,563
Union	555	1	23	229	302	1,878	4	5	832	1,037
Total	16,767	179	677	6,625	9,286	62,360	501	212	26,806	34,841

(Table 30 continued on next page)

[1/] International 1/4-inch rule.

(Table 30 continued)

Unit and county	Growing stock					Sawtimber				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Thousand cubic feet					Thousand board feet[1]				
Northern Unit										
Adams	462	7	--	200	255	2,175	86	-2	785	1,306
Allen	832	19	1	378	434	3,442	225	--	1,209	2,008
Bartholomew	1,434	13	1	597	823	6,962	159	-8	2,468	4,343
Benton	56	1	--	24	31	253	12	--	94	147
Blackford	310	1	--	126	183	1,563	19	-2	557	989
Boone	467	2	--	193	272	2,191	24	-3	776	1,394
Carroll	585	7	--	250	328	2,726	92	-3	983	1,654
Cass	788	20	--	359	409	3,588	261	-2	1,320	2,009
Clinton	292	1	--	116	175	1,401	13	-2	486	904
Decatur	796	4	1	322	469	3,891	62	-5	1,377	2,457
De Kalb	901	25	--	417	459	4,041	330	-2	1,526	2,187
Delaware	496	11	--	225	260	2,171	144	-1	801	1,227
Elkhart	909	18	1	410	480	4,005	219	-2	1,460	2,328
Fountain	1,236	31	1	560	644	5,711	412	-4	2,125	3,178
Fulton	658	15	--	294	349	3,022	189	-2	1,105	1,730
Grant	625	8	--	266	351	2,995	120	-3	1,094	1,784
Hamilton	651	13	1	298	339	2,858	186	-1	1,070	1,603
Hancock	392	11	--	181	200	1,747	150	-1	663	935
Hendricks	531	6	--	225	300	2,482	62	-3	872	1,551
Henry	648	11	--	285	352	2,967	141	-3	1,084	1,745
Howard	237	3	--	104	130	964	39	--	336	589
Huntington	709	19	--	319	371	3,073	244	-1	1,105	1,725
Jasper	834	15	1	370	448	3,741	173	-2	1,343	2,227
Jay	793	3	1	319	470	3,989	43	-6	1,406	2,546
Johnson	633	3	1	258	371	3,106	37	-4	1,100	1,973
Kosciusko	1,092	6	1	444	641	5,469	83	-7	1,933	3,460
La Grange	1,056	22	--	484	550	4,591	274	-3	1,724	2,596
Lake	589	11	--	261	317	2,715	147	-2	1,003	1,567
La Porte	1,282	19	1	567	695	5,767	228	-4	2,088	3,455
Madison	432	5	--	181	246	2,073	70	-2	739	1,266
Marion	14	--	--	6	8	37	--	--	11	26
Marshall	959	20	--	425	514	4,441	237	-3	1,595	2,612
Miami	866	8	1	360	497	4,275	110	-6	1,543	2,628
Montgomery	803	22	1	372	408	3,503	314	-1	1,328	1,862
Newton	644	12	--	283	349	3,059	176	-3	1,143	1,743
Noble	1,016	24	1	463	528	4,480	322	-2	1,656	2,504
Porter	959	21	1	440	497	4,174	278	-2	1,578	2,320
Pulaski	879	20	1	396	462	3,978	260	-2	1,463	2,257
Randolph	647	3	--	258	386	3,155	42	-4	1,105	2,012
Rush	341	8	--	153	180	1,407	92	--	497	818
St. Joseph	703	16	1	321	365	3,052	195	-1	1,129	1,729
Shelby	425	4	--	177	244	2,085	59	-3	758	1,271
Starke	868	16	1	383	468	3,998	206	-3	1,458	2,337
Steuben	981	24	1	450	506	4,270	316	-2	1,597	2,359
Tippecanoe	738	22	--	344	372	3,205	293	-1	1,209	1,704
Tipton	128	3	--	57	68	519	34	--	187	298
Wabash	747	17	--	341	389	3,262	216	-2	1,224	1,824
Warren	761	12	--	329	420	3,554	153	-3	1,289	2,115
Wayne	995	21	--	446	528	4,545	270	-3	1,658	2,620
Wells	540	13	--	246	281	2,393	180	-1	902	1,312
White	392	10	--	183	199	1,652	130	--	619	903
Whitley	648	16	--	295	337	2,938	203	-2	1,077	1,660
Total	35,780	642	19	15,761	19,358	163,661	8,330	-124	59,658	95,797
All counties	153,635	4,365	2,273	63,067	83,930	725,944	32,453	6,850	259,491	427,150

[1] International 1/4-inch rule.

Table 31.--Average annual timber removals from growing stock and sawtimber on timberland by county and species group, Indiana, 1966-1985

Unit and county	Growing stock					Sawtimber				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Thousand cubic feet					Thousand board feet[1]				
Lower Wabash Unit										
Clay	811	--	--	220	591	3,553	--	--	892	2,661
Daviess	849	--	84	264	501	3,757	--	459	1,087	2,211
Gibson	1,001	--	170	308	523	4,436	--	918	1,236	2,282
Greene	1,471	--	--	475	996	6,411	--	--	1,983	4,428
Knox	757	--	82	204	471	3,284	--	444	767	2,073
Martin	2,587	--	34	759	1,794	11,877	--	183	3,319	8,375
Parke	1,843	--	114	625	1,104	8,126	--	612	2,720	4,794
Pike	1,292	--	12	427	853	5,696	--	61	1,890	3,745
Posey	1,551	--	179	520	852	6,923	--	963	2,167	3,793
Putnam	1,756	--	19	404	1,333	8,012	--	106	1,690	6,216
Sullivan	1,166	--	71	387	708	5,125	--	383	1,629	3,113
Vanderburgh	489	--	3	128	358	1,954	--	16	484	1,454
Vermillion	564	--	3	168	393	2,467	--	16	678	1,773
Vigo	797	--	16	249	532	3,403	--	92	1,026	2,285
Total	16,934	--	787	5,138	11,009	75,024	--	4,253	21,568	49,203
Knobs Unit										
Brown	2,994	7	11	305	2,671	12,877	29	34	1,265	11,549
Clark	1,247	3	4	183	1,057	5,436	15	14	759	4,648
Crawford	2,412	4	5	271	2,132	9,645	16	18	1,081	8,530
Dubois	1,375	6	15	187	1,167	6,153	28	41	797	5,287
Floyd	777	35	17	87	638	3,483	186	18	388	2,891
Harrison	1,764	5	17	331	1,411	7,575	26	82	1,359	6,108
Jackson	1,940	2	6	262	1,670	7,986	9	24	1,067	6,886
Lawrence	2,330	6	11	240	2,073	9,744	30	25	966	8,723
Monroe	4,194	6	12	398	3,778	17,000	30	27	1,625	15,318
Morgan	1,271	2	6	230	1,033	5,317	10	21	949	4,337
Orange	2,063	3	6	285	1,769	8,297	12	24	1,135	7,126
Owen	1,570	9	28	224	1,309	7,013	41	43	979	5,950
Perry	2,968	7	5	274	2,682	11,895	13	19	1,105	10,758
Scott	651	1	3	94	553	2,874	5	16	388	2,465
Spencer	910	2	5	133	770	3,913	9	21	543	3,340
Warrick	1,023	4	4	176	839	4,356	16	16	734	3,590
Washington	1,811	9	40	268	1,494	7,998	44	75	1,172	6,707
Total	31,300	111	195	3,948	27,046	131,562	519	518	16,312	114,213
Upland Flats Unit										
Dearborn	673	--	7	262	404	3,222	--	--	1,294	1,928
Fayette	182	--	6	62	114	814	--	--	277	537
Franklin	421	--	10	115	296	1,904	--	--	511	1,393
Jefferson	750	--	12	151	587	3,533	--	--	690	2,843
Jennings	682	--	9	272	401	3,213	--	--	1,332	1,881
Ohio	188	--	2	70	116	900	--	--	339	561
Ripley	730	--	15	135	580	3,349	--	--	587	2,762
Switzerland	898	--	4	284	610	4,354	--	--	1,399	2,955
Union	123	--	5	40	78	536	--	--	179	357
Total	4,647	--	70	1,391	3,186	21,825	--	--	6,608	15,217

(Table 31 continued on next page)

[1] International 1/4-inch rule.

(Table 31 continued)

Unit and county	Growing stock					Sawtimber				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Thousand cubic feet					Thousand board feet[1/]				
Northern Unit										
Adams	257	--	--	76	181	1,132	--	--	327	805
Allen	599	1	--	218	380	2,596	--	--	905	1,691
Bartholomew	846	--	--	265	581	3,803	--	--	1,167	2,636
Benton	56	--	--	16	40	208	--	--	60	148
Blackford	190	--	--	59	131	857	--	--	262	595
Boone	335	--	--	107	228	1,490	--	--	469	1,021
Carroll	355	--	--	107	248	1,572	--	--	462	1,110
Cass	320	1	--	91	228	1,363	--	--	366	997
Clinton	241	--	--	64	177	1,047	--	--	279	768
Decatur	549	1	--	158	390	2,455	--	--	703	1,752
De Kalb	318	1	--	91	226	1,345	--	--	359	986
Delaware	278	--	--	97	181	1,174	--	--	396	778
Elkhart	486	1	--	130	355	2,128	--	--	533	1,595
Fountain	475	1	--	138	336	2,064	--	--	566	1,498
Fulton	303	--	--	94	209	1,323	--	--	395	928
Grant	394	--	--	117	277	1,724	--	--	497	1,227
Hamilton	324	--	--	91	233	1,383	--	--	367	1,016
Hancock	160	--	--	48	112	660	--	--	183	477
Hendricks	320	--	--	99	221	1,414	--	--	430	984
Henry	351	--	--	107	244	1,513	--	--	447	1,066
Howard	235	--	--	90	145	1,022	--	--	384	638
Huntington	315	1	--	107	207	1,339	--	--	434	905
Jasper	460	--	--	133	327	2,014	--	--	559	1,455
Jay	504	--	--	152	352	2,283	--	--	678	1,605
Johnson	400	--	--	126	274	1,801	--	--	557	1,244
Kosciusko	689	1	--	212	476	3,107	--	--	941	2,166
La Grange	422	1	--	122	299	1,789	--	--	492	1,297
Lake	425	--	--	127	298	1,768	--	--	498	1,270
La Porte	735	1	--	202	532	3,232	--	--	850	2,382
Madison	311	--	--	91	220	1,344	--	--	386	958
Marion	463	--	--	146	317	1,928	--	--	554	1,374
Marshall	432	--	--	128	304	1,903	--	--	541	1,362
Miami	502	--	--	157	345	2,252	--	--	691	1,561
Montgomery	372	1	--	129	242	1,566	--	--	518	1,048
Newton	316	--	--	99	217	1,364	--	--	415	949
Noble	476	1	--	160	315	2,049	--	--	664	1,385
Porter	472	1	--	133	338	1,958	--	--	520	1,438
Pulaski	405	1	--	121	283	1,772	--	--	506	1,266
Randolph	487	--	--	129	358	2,161	--	--	570	1,591
Rush	227	--	--	82	145	977	--	--	346	631
St. Joseph	419	1	--	114	304	1,777	--	--	449	1,328
Shelby	250	--	--	77	173	1,097	--	--	332	765
Starke	427	--	--	125	302	1,898	--	--	529	1,369
Steuben	445	1	--	152	292	1,919	--	--	624	1,295
Tippecanoe	333	1	--	111	221	1,387	--	--	439	948
Tipton	95	--	--	34	61	399	--	--	138	261
Wabash	340	1	--	102	237	1,418	--	--	406	1,012
Warren	411	--	--	131	280	1,832	--	--	566	1,266
Wayne	471	1	--	137	333	2,042	--	--	564	1,478
Wells	263	--	--	89	174	1,104	--	--	360	744
White	196	--	--	58	138	792	--	--	225	567
Whitley	254	--	--	71	183	1,085	--	--	286	799
Total	19,709	19	--	6,020	13,670	85,630	--	--	25,195	60,435
All counties	72,590	130	1,052	16,497	54,911	314,041	519	4,771	69,683	239,068

[1/] International 1/4-inch rule.

Table 32.--Net annual growth and current annual timber removals from growing stock on timberland by species group and Forest Survey Unit, Indiana, 1985

(In thousand cubic feet)

Species group	Growth					Removals				
	All Units	Lower Wabash Unit	Knobs Unit	Upland Flats Unit	Northern Unit	All Units	Lower Wabash Unit	Knobs Unit	Upland Flats Unit	Northern Unit
Softwoods										
Pine	3,838	932	2,331	179	396	184	2	151	1/	31
Baldcypress	138	119	19	--	--	--	--	--	--	--
Eastern redcedar	2,133	57	1,382	677	17	119	1	101	17	--
Other softwoods	529	--	281	--	248	--	--	--	--	--
Total	6,638	1,108	4,013	856	661	303	3	252	17	31
Hardwoods										
Select white oak	15,350	2,735	8,369	1,479	2,767	12,310	2,804	5,191	796	3,519
Other white oak	2,425	83	2,334	1	7	2,700	162	2,306	12	220
Select red oak	8,276	1,686	3,386	830	2,374	9,976	2,089	4,366	726	2,795
Other red oak	14,388	3,316	7,257	968	2,847	17,035	3,836	9,200	744	3,255
Select hickory	5,583	1,354	1,937	640	1,652	3,397	1,101	1,320	106	870
Other hickory	6,402	1,548	2,511	952	1,391	3,625	1,142	1,800	162	521
Basswood	1,693	250	124	197	1,122	935	147	156	66	566
Beech	1,504	61	900	177	366	3,426	496	1,410	333	1,187
Hard maple	13,833	2,249	7,127	1,816	2,641	5,437	882	2,646	203	1,706
Soft maple	12,287	3,472	4,951	744	3,120	3,150	854	771	184	1,341
Elm	4,654	452	362	581	3,259	888	260	247	10	371
Ash	10,079	2,002	3,132	1,514	3,431	7,781	1,878	2,448	696	2,759
Sycamore	6,232	1,658	2,688	653	1,233	3,242	815	1,079	212	1,136
Cottonwood	3,789	972	478	99	2,240	1,920	508	304	160	948
Aspen	728	52	517	120	39	285	24	65	15	181
Birch	450	193	202	--	55	332	41	221	19	51
Sweetgum	3,203	680	1,589	879	55	1,049	279	486	221	63
Tupelo	1,134	295	603	228	8	538	143	282	88	25
Black cherry	2,961	511	944	325	1,181	1,519	321	476	86	636
Black walnut	3,959	927	883	707	1,442	1,924	496	479	153	796
Yellow-poplar	20,032	4,918	10,946	2,171	1,997	9,663	2,816	5,192	604	1,051
Other hardwoods	8,035	1,620	3,693	830	1,892	1,390	359	282	68	681
Total	146,997	31,034	64,933	15,911	35,119	92,522	21,453	40,727	5,664	24,678
All species	153,635	32,142	68,946	16,767	35,780	92,825	21,456	40,979	5,681	24,709

1/ Less than 500 cubic feet.

Table 33.--Net annual growth and current annual timber removals from sawtimber on timberland by species group and Forest Survey Unit, Indiana, 1985

(In thousand board feet)[1/]

Species group	Growth					Removals				
	All Units	Lower Wabash Unit	Knobs Unit	Upland Flats Unit	Northern Unit	All Units	Lower Wabash Unit	Knobs Unit	Upland Flats Unit	Northern Unit
Softwoods										
Pine	28,868	5,028	18,343	501	4,996	826	14	721	2	89
Baldcypress	744	643	101	--	--	--	--	--	--	--
Eastern redcedar	6,237	-72	6,090	212	7	231	5	179	47	--
Other softwoods	3,454	--	251	--	3,203	--	--	--	--	--
Total	39,303	5,599	24,785	713	8,206	1,057	19	900	49	89
Hardwoods										
Select white oak	79,020	12,302	48,329	5,639	12,750	61,583	14,125	25,305	4,208	17,945
Other white oak	13,109	742	12,192	-24	199	12,740	695	10,908	47	1,090
Select red oak	50,361	8,458	17,443	4,365	20,095	51,242	10,702	22,166	3,947	14,427
Other red oak	77,947	17,130	41,071	3,870	15,876	86,148	19,477	47,087	3,798	15,786
Select hickory	28,196	9,622	8,735	3,547	6,292	16,538	5,522	6,408	533	4,075
Other hickory	35,440	11,171	16,989	3,185	4,095	17,140	5,633	8,213	788	2,506
Basswood	9,019	2,651	795	1,537	4,036	4,452	763	739	351	2,599
Beech	5,676	400	3,301	402	1,573	17,612	2,581	7,195	1,700	6,136
Hard maple	59,429	14,850	32,476	3,776	8,327	25,614	4,230	12,196	902	8,286
Soft maple	36,743	15,176	11,058	1,882	8,627	15,098	4,171	3,736	921	6,270
Elm	6,401	53	1,246	306	4,796	3,929	1,313	1,009	44	1,563
Ash	49,560	6,306	16,259	6,756	20,239	36,840	9,105	11,284	3,295	13,156
Sycamore	31,449	7,065	15,371	3,611	5,402	16,304	4,016	5,419	1,123	5,746
Cottonwood	19,464	4,536	2,651	395	11,882	11,072	2,949	1,660	943	5,520
Aspen	5,517	--	4,602	370	545	1,078	127	271	81	599
Birch	1,262	426	798	--	38	1,679	227	1,085	99	268
Sweetgum	11,577	1,331	6,916	3,221	109	5,410	1,397	2,558	1,162	293
Tupelo	5,201	435	3,678	1,031	57	2,748	711	1,436	462	139
Black cherry	16,699	1,724	8,857	1,311	4,807	7,761	1,673	2,464	453	3,171
Black walnut	19,928	6,405	6,323	3,021	4,179	11,003	2,993	2,865	987	4,158
Yellow-poplar	90,476	19,746	54,629	8,630	7,471	50,667	14,714	27,323	3,185	5,445
Other hardwoods	34,167	7,673	7,618	4,816	14,060	4,495	1,012	995	240	2,248
Total	686,641	148,202	321,337	61,647	155,455	461,153	108,136	202,322	29,269	121,426
All species	725,944	153,801	346,122	62,360	163,661	462,210	108,155	203,222	29,318	121,515

[1/] International 1/4-inch rule.

Table 34.--Net annual growth and current annual timber removals of growing stock on timberland by ownership class and species group, Indiana, 1985

(In thousand cubic feet)

Ownership class	Growth					Removals				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
National forest	4,220	-251	13	1,523	2,935	3,897	8	--	221	3,668
Miscellaneous federal	5,889	5	11	2,423	3,450	407	--	--	40	367
State	7,106	570	-5	2,284	4,257	1,701	4	8	262	1,427
County and municipal	947	--	8	538	401	56	16	--	28	12
Forest industry	538	--	--	95	443	1,103	1	--	60	1,042
Farmer and other private	134,935	4,041	2,246	56,204	72,444	85,661	155	111	23,968	61,427
All ownerships	153,635	4,365	2,273	63,067	83,930	92,825	184	119	24,579	67,943

Table 35.--Net annual growth and current annual timber removals of sawtimber on timberland by ownership class and species group, Indiana, 1985

(In thousand board feet)[1/]

Ownership class	Growth					Removals				
	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods
National forest	28,429	7,208	80	2,820	18,321	17,502	32	--	957	16,513
Miscellaneous federal	27,214	25	16	10,652	16,521	2,001	--	--	214	1,787
State	27,323	2,006	-176	7,301	18,192	8,265	24	36	1,244	6,961
County and municipal	4,613	--	--	2,400	2,213	20	--	--	14	6
Forest industry	2,772	--	--	-222	2,994	5,876	6	--	324	5,546
Farmer and other private	635,593	23,214	6,930	236,540	368,909	428,546	764	195	120,261	307,326
All ownerships	725,944	32,453	6,850	259,491	427,150	462,210	826	231	123,014	338,139

[1/] International 1/4-inch rule.

Table 36.--Annual mortality of growing stock and sawtimber on timberland by species group, Indiana, 1985

Species group	Growing stock	Sawtimber
	Thousand cubic feet	Thousand board feet[1/]
Softwoods		
Jack pine	42	160
Red pine	16	34
White pine	197	243
Shortleaf pine	812	931
Other yellow pines	531	1,215
Tamarack	46	249
Baldcypress	156	703
Eastern redcedar	329	988
Other softwoods	51	9
Total	2,180	4,532
Hardwoods		
Select white oak	1,548	5,140
Other white oak	548	1,903
Select red oak	1,465	5,737
Other red oak	3,139	11,857
Select hickory	1,264	3,866
Other hickory	1,472	4,314
Basswood	509	1,278
Beech	515	1,945
Hard maple	2,022	5,302
Soft maple	2,237	6,757
Elm	4,275	9,453
Ash	2,195	5,561
Sycamore	1,761	6,902
Cottonwood	956	3,944
Willow	581	2,088
Hackberry	1,004	2,787
Aspen	739	1,598
Birch	94	45
Sweetgum	615	1,929
Tupelo	228	814
Black cherry	1,754	2,729
Black walnut	1,146	1,964
Butternut	135	454
Yellow-poplar	1,005	4,264
Persimmon	282	93
Sassafras	1,994	1,702
Other hardwoods	1,862	2,291
Total	35,345	96,717
All species	37,525	101,249

[1/] International 1/4-inch rule.

Table 37.--Removals,[1] net annual growth, and inventory of growing stock on timberland, Indiana, 1986, and low removals option projections[2] to 2016

(In million cubic feet)

Year	All species		
	Removals	Growth	Inventory
1986	92.8	153.6	5,217.9
1996	104.6	170.6	5,883.3
2006	113.4	188.3	6,494.9
2016	119.0	203.3	7,014.5

[1] Timber removals include volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2] Based on the following assumptions: (a) that the area of timberland will decline but at an insignificant rate; (b) that radial growth will decline over time in relation to increased stand density; (c) that the intensity of forest management practised will continue at the rate indicated by recent trends; and (d) that the volume of "other" removals will drop during the period as more of these trees are utilized.

Table 38.--Removals,[1] net annual growth, and inventory of growing stock on timberland, Indiana, 1986, and high removals option projections[2] to 2016

(In million cubic feet)

Year	All species		
	Removals	Growth	Inventory
1986	92.8	153.6	5,217.9
1996	128.9	165.7	5,758.7
2006	160.5	172.5	5,941.1
2016	181.5	165.5	5,706.5

[1] Timber removals include volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2] Based on the following assumptions: (a) that the area of timberland will decline but at an insignificant rate; (b) that radial growth will decline over time in relation to increased stand density; (c) that the intensity of forest management practised will continue at the rate indicated by recent trends; and (d) that the volume of "other" removals will drop during the period as more of these trees are utilized.

Table 39.--Sampling errors for Forest Survey Unit and county totals of volume, net annual growth, average annual removals, and area of timberland, Indiana, 1986

(In percent)

Unit and county	Area	Growing stock			Sawtimber		
		Volume	Growth	Removals[2/]	Volume	Growth	Removals
Lower Wabash Unit							
Clay	11.11	15.76	21.69	55.98	18.42	12.59	57.45
Daviess	11.46	16.21	22.69	54.71	18.94	14.10	55.87
Gibson	11.41	16.60	22.52	50.38	19.66	14.34	51.42
Greene	7.20	10.38	13.99	41.57	12.29	8.93	42.77
Knox	13.32	19.81	27.71	57.93	23.30	15.90	59.76
Martin	6.52	8.60	12.85	31.34	9.83	7.40	31.42
Parke	7.90	10.88	14.72	37.13	12.85	9.37	37.99
Pike	8.07	11.29	15.39	44.35	13.33	9.84	45.38
Posey	11.01	14.91	21.30	40.47	17.26	12.58	41.16
Putnam	8.45	11.69	16.75	38.04	13.52	8.96	38.26
Sullivan	9.19	12.87	17.66	46.68	15.13	11.21	47.84
Vanderburgh	14.87	21.47	29.17	72.12	25.36	17.48	77.48
Vermillion	12.55	18.01	25.02	67.11	21.14	15.20	68.94
Vigo	10.37	15.15	20.66	56.46	17.96	13.07	58.71
Total	2.52	3.53	4.92	12.28	4.13	2.98	12.54
Knobs Unit							
Brown	3.02	6.85	11.65	23.60	8.35	19.72	25.25
Clark	3.76	8.91	14.77	36.58	10.88	25.57	38.87
Crawford	3.17	7.54	12.56	26.30	9.25	21.65	29.18
Dubois	3.59	8.49	14.26	34.83	10.29	24.18	36.53
Floyd	5.90	13.73	23.10	46.32	16.64	36.57	48.56
Harrison	3.01	7.13	11.64	30.75	8.81	20.99	32.93
Jackson	3.15	7.49	12.13	29.32	9.31	22.07	32.07
Lawrence	3.09	7.03	12.03	26.75	8.51	20.09	29.03
Monroe	3.20	7.36	12.30	19.94	8.98	21.47	21.98
Morgan	3.72	9.04	14.76	36.23	11.14	26.64	39.30
Orange	3.05	7.11	11.90	28.43	8.76	20.45	31.46
Owen	3.34	7.98	13.24	32.59	9.71	21.69	34.22
Perry	2.80	6.47	10.95	23.70	8.00	18.46	26.28
Scott	5.28	12.67	20.69	50.61	15.57	37.26	53.45
Spencer	4.38	10.67	17.40	42.81	13.08	31.55	45.81
Warrick	3.84	9.66	15.07	40.38	12.09	28.82	43.42
Washington	3.17	7.48	12.44	30.35	9.09	19.83	32.04
Total	0.83	1.95	3.24	7.26	2.39	5.58	7.87
Upland Flats Unit							
Dearborn	8.86	13.38	18.54	55.22	16.95	28.63	54.87
Fayette	14.62	24.73	32.24	* [1/]	32.61	51.41	*
Franklin	9.43	15.86	20.44	69.80	20.80	32.71	71.39
Jefferson	9.56	13.47	19.66	52.28	16.83	26.89	52.41
Jennings	9.04	13.68	18.85	54.85	17.32	28.96	54.95
Ohio	16.02	24.76	33.84	*	31.54	52.83	*
Ripley	9.72	14.27	20.45	53.03	17.83	28.43	53.82
Switzerland	9.76	13.10	19.81	47.80	15.92	27.36	47.20
Union	18.29	31.26	41.02	*	41.02	65.45	*
Total	3.54	5.32	7.45	21.06	6.71	11.01	21.13

(Table 39 continued on next page)

[1/] * indicates a sampling error over 99.00 percent.

[2/] Error figures are for average annual removals.

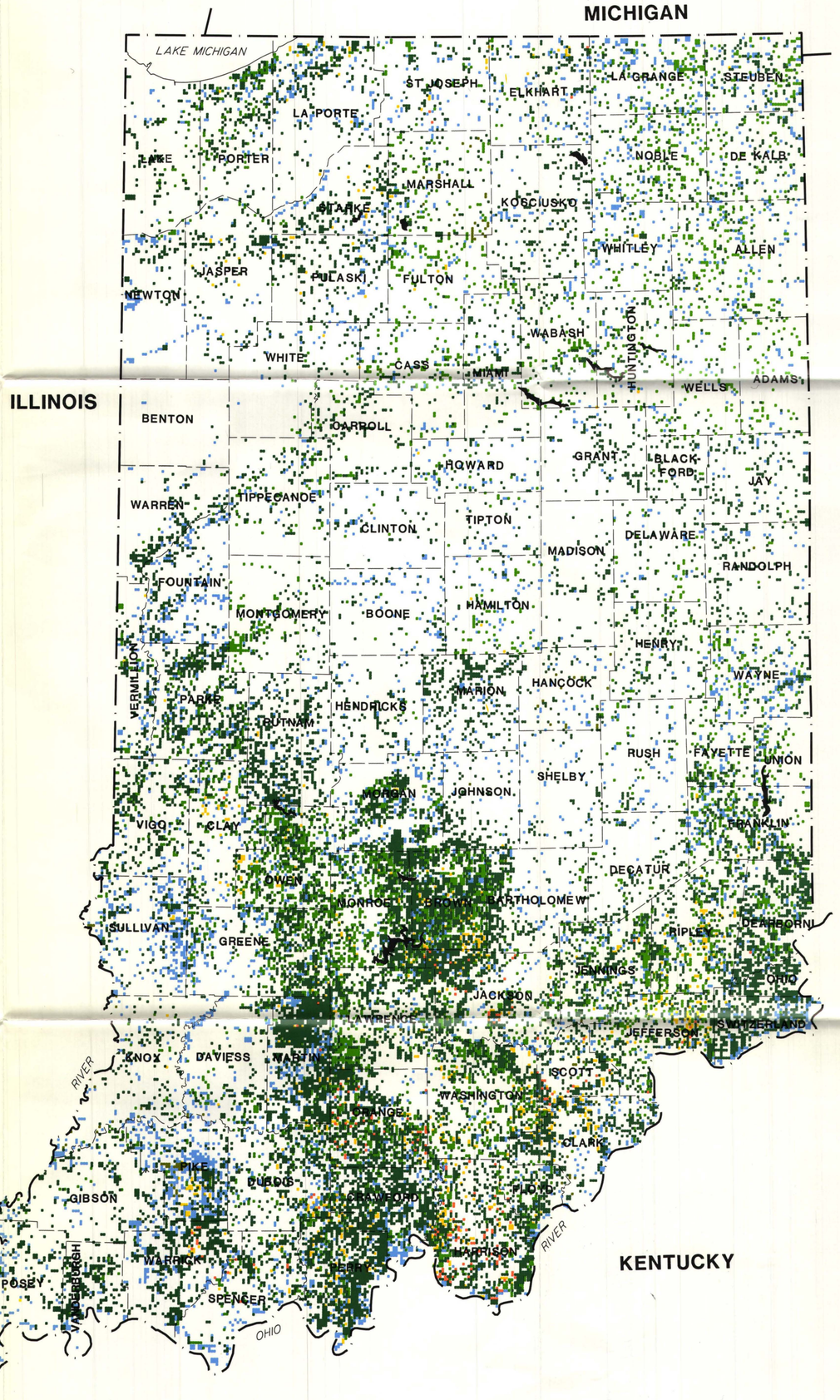
(Table 39 continued)

Unit and county	Area	Growing stock			Sawtimber		
		Volume	Growth	Removals[2]	Volume	Growth	Removals
Northern Unit							
Adams	21.78	33.52	88.35	97.99	37.45	*	*
Allen	14.98	26.15	57.03	64.17	29.89	93.49	66.06
Bartholomew	12.22	18.57	53.20	53.96	20.59	80.92	54.59
Benton	66.77	97.55	*	*	*	*	*
Blackford	26.67	39.18	*	*	43.07	*	*
Boone	20.97	32.55	84.96	85.78	36.04	*	87.23
Carroll	19.06	29.60	75.87	83.35	33.03	*	84.91
Cass	16.62	26.55	68.63	87.75	30.20	*	91.19
Clinton	26.96	40.31	*	*	44.26	*	*
Decatur	16.66	24.55	71.15	67.00	27.04	*	67.94
De Kalb	15.65	25.07	64.78	88.02	28.67	*	91.80
Delaware	20.57	33.41	80.82	94.08	38.00	*	98.27
Elkhart	15.16	24.66	56.11	71.24	27.96	93.44	72.97
Fountain	13.52	21.08	56.43	71.98	23.89	84.76	74.10
Fulton	18.11	28.73	76.03	90.00	32.47	*	92.55
Grant	19.17	28.43	78.90	79.05	31.63	*	81.07
Hamilton	18.29	29.25	67.22	87.21	33.34	*	90.54
Hancock	23.81	37.99	95.59	*	43.44	*	*
Hendricks	19.44	30.99	83.79	87.75	34.54	*	89.52
Henry	18.02	28.54	74.28	83.82	32.13	*	86.54
Howard	27.88	47.91	*	*	54.14	*	*
Huntington	17.09	28.19	71.11	88.43	32.19	*	92.00
Jasper	15.74	25.45	61.10	73.21	28.73	99.00	75.01
Jay	16.69	24.47	75.50	69.90	26.86	*	70.46
Johnson	18.24	27.59	80.06	78.46	30.41	*	79.34
Kosciusko	14.24	20.97	63.66	59.82	23.07	96.49	60.40
La Grange	13.65	23.00	58.10	76.41	26.30	88.49	79.60
Lake	19.38	30.09	78.14	76.14	33.95	*	80.07
La Porte	12.71	20.43	48.50	57.89	23.04	79.20	59.22
Madison	22.68	34.06	97.00	89.00	37.80	*	91.83
Marion	*	*	*	72.98	*	*	*
Marshall	14.69	23.67	64.29	75.52	26.67	98.85	77.16
Miami	16.23	23.82	70.00	70.04	26.34	*	70.94
Montgomery	16.69	26.65	63.63	81.44	30.51	97.74	85.08
Newton	19.33	28.53	78.14	88.30	32.03	*	91.16
Noble	14.39	23.45	57.58	71.98	26.73	88.83	74.37
Porter	14.78	24.14	56.83	72.28	27.66	87.19	76.08
Pulaski	15.74	25.00	62.24	77.98	28.32	97.83	79.98
Randolph	18.42	27.05	78.78	71.17	29.72	*	72.42
Rush	23.22	40.67	90.34	*	46.38	*	*
St. Joseph	17.24	28.34	64.29	76.68	32.35	*	79.87
Shelby	23.13	34.10	*	99.34	37.72	*	*
Starke	15.77	24.76	62.53	75.96	27.85	98.62	77.28
Steuben	14.57	23.96	58.00	74.42	27.37	89.87	76.84
Tippecanoe	17.20	27.92	66.57	86.03	32.05	*	90.38
Tipton	37.72	66.21	*	*	75.43	*	*
Wabash	16.69	27.28	65.69	85.15	31.20	*	89.39
Warren	16.76	26.11	68.91	77.41	29.20	*	78.65
Wayne	14.48	23.35	61.74	72.36	26.45	93.45	74.49
Wells	20.32	32.12	79.20	96.87	36.61	*	*
White	22.68	38.52	89.81	*	44.42	*	*
Whitley	18.06	29.26	76.57	98.56	33.29	*	*
Total	2.44	3.88	9.96	11.23	4.37	15.47	11.56
All counties	1.00	1.57	3.42	5.40	1.86	5.47	5.68

[1] * indicates a sampling error over 99.00 percent.

[2] Error figures are for average annual removals.

INDIANA
Major Forest Types
1986



- Pine
- Oak-Pine
- Oak-Hickory
- Oak-Gum
- Elm-Ash-Soft Maple
- Maple-Beech
- Non-Forest
- Water

SCALE 1:1,000,000

10 0 10 20 30 40 Miles

10 0 10 20 30 40 50 Kilometers

Compilation Procedure

Forest types were interpreted on the most recent available aerial photography for each county in Indiana at 1:40,000 and 1:58,000 scale, using standard forest inventory procedures and plotted on a 1:1,000,000 scale map.
Compiled by: Ronald L. Hackett, Thomas Castonguay, Brad Smith, and Patrick Miles.
Prepared by Martinez Corporation

Forest Inventory and Analysis Project
North Central Forest Experiment Station
Forest Service
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Spencer, John S., Jr.; Kingsley, Neal P.; Mayer, Robert W. 1990. **Indiana's timber resource, 1986: An analysis.** Resour. Bull. NC-113. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 85 p.

The third inventory of Indiana's timber resource shows that area of timberland increased from 3.9 to 4.3 million acres between 1967 and 1986, and growing-stock volume gained from 3.7 to 5.2 billion cubic feet. Presented are analysis and statistics on forest area and timber volume, growth, mortality, removals, and projections.

KEY WORDS: Forest statistics, area, volume, growth, mortality, removals.

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Our job at the North Central Forest Experiment Station is creating, evaluating, and disseminating information and technology to improve management and use of our natural resources.

As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.